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SPECIAL ISSUE FOR CIVIL DEFENCE

FOREWORD

In December 1952, the Canadian Medical Association performed a valuable national service by collaborating with Civil Defence Health Services of the Department of National Health and Welfare in the publication of a special issue of its Journal. Now, four years later, further impetus is given to Canada's Civil Defence program by the publication of the second Civil Defence issue of the Canadian Medical Association Journal.

This second issue is a follow-up of the first, and is intended to bring health services planning up to date. All the articles have been prepared by selected experts, with assistance from the medical advisory panels of the Defence Research Board and the Medical Services of the Armed Forces. Federal Civil Defence Health Services acted as co-ordinators and also provided some of the material.

Emphasis is placed on changes in planning brought about by high-yield thermonuclear weapons, necessitating the acceptance of evacuation for our major Canadian cities. Several of the articles cover new areas of planning, and it is believed that this issue, along with the first, provides most of the basic information around which a health services organization can be built.

Despite the great increase in weapon potential, it is encouraging to note that most of the basic civil defence health services plans have been completed and that we have entered the stage of implementation. This stage will call for wide support from the medical profession. I am confident that your profession, in its tradition of public service, will respond to the present challenge and provide good, strong medical leadership.

Paul Martin

Minister of National Health and Welfare

WEAPONS OF MASS DESTRUCTION A GENERAL STATEMENT

M. G. WHILLANS, M.D., *Ottawa*

I. INTRODUCTION

WAR, AND THE PREVENTION OF WAR, is everybody's business. The larger threat from modern weapons of mass destruction demands a corresponding effort in countering that threat, and in devising means of surviving war. It is axiomatic that the counter-preparation should match the threat, and that this matching preparation must involve not only adequate weapons of defence, but also a strong civil defence organization and a well-informed, prepared public. Individual initiative and courage will mean little unless it is part of the larger team-work. The new weapons pose new problems in understanding and in planning to meet the new scales of destruction. None of these problems is more important than those of sorting and caring for casualties. It is because the medical profession must play such a vital role in civil defence that this introductory article on the new weapons was suggested.

Examples of mass destruction in war are numerous. The ancients employed fire in favourable winds to destroy enemy cities. Floods and "scorched earth" have been used with telling effect. The carnage during the long war in Europe in the 17th century still impresses us. Over seven million people lost their lives, and whole cities were sacked and burned. In proportion to the population as it then was, the losses were very great indeed. Proportionately, the threat today may be no greater than those faced by our forebears.

II. THE WEAPONS

This brief discussion deals only with atomic, biological and chemical weapons, and with psychological warfare. The omission of other weapons (such as fire, famine, flooding) should not suggest that they may be less important, or provide no surprises in future conflicts.

The tactics in the use of these weapons involves a full appreciation of the degree and quality of the civil defence preparedness in the

target country, and the help which climate and terrain may afford the attacker.

Whatever the weapon and tactics, civil defence preparations against the attack must depend on an adequate warning system. Our radar warning lines have purchased time for us to evacuate cities when attacks are expected from intercontinental bombers. Whether such a warning system will provide sufficient warning against intercontinental ballistic missiles is not the purpose of this discussion. Effective defence against such threats is becoming so expensive and difficult, and the ability to retaliate so much a deterrent, that the old meaning of the word "weapon" has a very modern application. *Waepn* is the old English word for a shield, and these modern weapons, through the overwhelming retaliatory power which they make possible, may prove effective shields, protecting us from large-scale war.

Atomic weapons now involve a wide range of explosive forces and varying modes of delivery. It is therefore dangerous to generalize for the group as a whole. While the scale of destruction is related to explosive energy, it is something of an exaggeration to use explosive forces only as a basis for comparison. The nominal bomb (equivalent to 20,000 tons of TNT), compared to a 20 megaton weapon (equivalent to 20 million tons of TNT), would have only 1/1000 the explosive force of the larger weapon, but would destroy 1/100 the area. The scale of destruction is such that the term "direct hit" has a new dimension. One whole city may be involved in the fireball, and shelters may have little value.

Blast is the most important military effect of the atomic weapons, but *thermal radiation* produces the major problems for medical care. Treatment of burns on a large scale will remain the big difficulty. With megaton explosions, as with weapons of the Hiroshima and Nagasaki type, there are important effects from the *immediate radiation* (largely gamma radiation), but radiation casualties would probably not exceed 20% of the total. Important *residual radioactivity* hazards from fallout result from larger explosions, as well as from those which touch the ground, or from underground and underwater bursts. The fallout, extensive as it might be, need not be a major casualty producer, if the population is aware of the danger, and

*Director, Personnel Research, and Assistant Chief Scientist, Defence Research Board, Ottawa.

knows the advantages of waiting, of shelters, and of keeping distance from active areas. Viewed in this manner, fallout is a considerable nuisance, but not necessarily a catastrophe.

The importance of *time* is summarized as follows: for every sevenfold increase in time, the radioactivity hazard decreases tenfold. The importance of *distance* is expressed in the inverse square law (intensity varies as the inverse square of the distance), which applies to radiation hazards as it does to illumination, for instance. Rain may never be more welcome than after fallout. A heavy fall of rain could quickly change an unsafe area into one which is safe.

The *internal hazard* has received much attention, and radioactive strontium (Sr^{90}), in particular, is cited as a danger. The hazard from ingesting radioactive material will not be great if we apply the knowledge we have. Simple precautions in monitoring, and in leaving for later inspection substances which may be contaminated, can provide an adequate margin of safety.

The controversy over the *genetic hazard* is evidence of the wide range of opinions which are admissible. For example, there are serious arguments that a higher mutation rate (induced by ionizing radiations) might be beneficial in accelerating the further development of the human race. Unless we have sound evidence to support such extreme views, we are bound to follow, as closely as feasible, the safety standards for radiation exposure. All the sound evidence we have points to one conclusion: any radiation from radioactive material is damaging.

Can there be an effective international *control* or prohibition of atomic weapons? The difficulties are impressive. The highly technical and expensive process of refining radioactive material, before it can be converted either to bomb-making or to peaceful applications, represents the bulk of the production effort towards either objective. It is only in the later stages of the process that the material is directed into one channel or the other, or stockpiled for either purpose. If necessary, the refined material can be converted from one form to the other. Production realities, therefore, make effective control extremely difficult.

Biological weapons.—While biological warfare has been studied closely, and received considerable attention from both military

scientists and the popular press, it remains something of an enigma. History affords us little help, for clear evidences of the use of biological warfare on a large scale have been lacking. If it has been used, the user has publicized neither his intentions nor the results of his efforts.

Claims have been made that whole countries could be swept by epidemics, and that crops could be ruined almost at will. None of these claims has been substantiated.

If a truly novel approach in biological warfare were to be sought, new pathogenic organisms would be required. Since there are great difficulties in producing such organisms, it can be assumed that microbiologists will be required to identify types already familiar to them. We would be dealing with a known disease which may be appearing at unusual times or places or in unusual numbers. For a number of reasons, biological weapons would likely be directed against livestock and crops, rather than against people.

An effective warning system against this type of warfare can largely be mobilized without much extra effort. It lies in the alert reporting and identification service already embodied in our public health and agricultural and veterinary organizations.

Although biological warfare must be accepted as a formidable possibility, there are technical difficulties in waging it on a large scale. As a sabotage weapon, as a nuisance, its advantages are obvious. It is also conceivable that our biting flies could be converted into vectors of disease; it is known that some varieties can and do carry disease organisms. But here again, the weapon is double-edged, retaliation is possible and there are technical difficulties. On a large scale, problems in delivering viable organisms and the influence of changes in the weather, for example, may upset the best laid plans.

Chemical weapons.—The element of surprise in the use of these agents has always been important. The Germans achieved almost complete surprise and success with a simple gas, chlorine. The newer agents, nerve gases, are almost unbelievably toxic, and because they are odourless and non-irritating, surprise can more readily be obtained. A lethal dose may be absorbed through the intact skin before the

victim is aware that he has been exposed. While gas masks may be effective against even the newer agents, there remains the great obstacle of early detection. The chief difficulty in achieving large-scale surprise with chemical, as with atomic, weapons lies in the mode of delivery.

Since the knowledge of these weapons and their potentialities is exclusive to no one nation, the same arguments regarding their retaliatory use apply, as they do to atomic weapons. The tactical employment of chemical agents would likely be somewhat specialized, with the main objective that of avoiding material damage. The capture of a port city, complete with harbour installations, and the rapid reduction of strong points, are examples. The employment of these agents is heavily dependent on the weather. As with fallout radioactivity, a heavy rain may quickly nullify an otherwise serious threat.

Psychological warfare.—We are engaged in this now. Like biological warfare, psychological warfare has been the subject of much highly coloured publicity. Like biological warfare, the techniques are known, there are unlikely to be any shortcuts, and preventive measures can be straightforward and will depend on an alert detection system.

Any applications of this weapon are likely to be skilful and the result of much thought and hard work. Our large advertising firms recognize the importance of putting the requisite effort into their expensive campaigns. The same simple lesson applies on the larger international scale. As with biological warfare, there is a double edge to the weapon, and those applying it must watch the effects of their own propaganda on themselves.

The tactics of psychological warfare in achieving panic, dissension and disaffection will vary widely, as we can plainly see on the international scene. They depend on a short memory in the target public, and on fear, most importantly. The longer the "cold war" goes on, the more difficult will it be successfully to employ distortions, lies, threats, and persuasions. Time is surely on the side of common sense. A deeper understanding of how little stomach the other side can have for all-out war, the ease with which either side may be tripped into war (by, for example, the landing of a large meteorite), the ominous dangers of even "peripheral" wars — all these are becoming in-

creasingly clear with time. As this understanding grows, it will be more difficult to achieve successful applications of mischievous propaganda.

III. DISCUSSION

The current military situation in the world might be characterized by two giants each of which is carrying an extremely destructive weapon in one of his hands, a weapon which he fears to use because of the other giant's obvious readiness to return any aggressive move. What are the giants doing with the other hand? We can expect (from one of the giants) a continuation of various probing tactics to explore weak spots in the other's defences, the possible incitement of "peripheral" wars, the encouragement of subversive activities, and war on the economic and cultural fronts. Psychological warfare will inevitably be an important part of the campaign. We shall have to anticipate and act quickly in countering the enemy's moves, while making our preparations for survival in the event of all-out war, within the limits of economic well-being. The philosophy of survival should be one of saving sufficient of our own people so that our concepts of freedom can be carried on, and not simply one of saving our individual skins.

In this larger challenge, there is little place for an individual to display his own brand of courage or ability, outside of team work. Everyone has an important place; none more so than those trained to look after the casualties, but each person's place should be found beforehand, if possible. No trained person should assume that after a catastrophe others will be able to tell him how and where he should be employed.

The assistance of Drs. C. W. MacCharles, L. W. Billingsley and E. E. Massey is gratefully acknowledged.

AN INDIRECT APPLICATION OF CIVIL DEFENCE

Speaking of a recent air disaster in California when a school playground was hit, a local physician stated: "When the aircraft disaster struck the school, our hospital was ready for the emergency. We were prepared because, luckily, we had training in civil defence. Hospital staff members attended several defence meetings sponsored by the Los Angeles County Medical Society. What we learned at these meetings we applied in handling our own disaster and the know-how helped us immeasurably to meet a gigantic emergency job."

A NEW LOOK AT CIVIL DEFENCE HEALTH SERVICES WITH PROGRESS TO DATE

K. C. CHARRON, M.D.,* Ottawa

THE TERRIFIC DESTRUCTIVE POWER of large atomic weapons with the associated hazard of radioactive fallout created new and expanded problems for civil defence. The principal change in planning brought about by this development was the acceptance of a policy of evacuation for cities considered to be potential enemy targets. Thirteen such cities have been named in Canada, with an aggregate population of over 5,800,000 people.

The rapid movement of populations of this magnitude and their reception into smaller communities is the major challenge which has to be faced by civil defence planners in Canada at the present time. Some have argued that it "can't be done", but fortunately those who have studied the different local situations consider that it is possible. Careful planning in advance is essential and the Canadian people must know "what to do and when to do it".

OPERATIONAL PLANNING FOR CIVIL DEFENCE

Operational planning for civil defence can be divided into four phases:

Phase A.—Pre-attack evacuation of pre-selected large cities. This is the thinning out of populations by evacuating priority groups during a period of strategic warning.

Phase B.—Planned withdrawal from pre-selected cities, to be put into operation on the alert signal.

Phase C.—Action after the incident occurs, to be put into operation in any area where an attack takes place.

Phase D.—Aid and rehabilitation, which will include both disaster cities and reception areas.

It will be noted that the war evacuation of Canadian cities has been divided into two phases, the first (Phase A) being a thinning out of population by the evacuation of priority classes from pre-selected cities, and the second (Phase B) being the planned withdrawal of the remainder of the population from these cities. Both

phases will have to be accomplished rapidly and it is possible that a situation might arise in which the two phases would become a single operation.

Priority classes will include: (a) Young children and school children accompanied by mothers or other responsible persons. Teachers should also be evacuated to reception areas to augment school facilities for children of school age in the reception communities. (b) Expectant mothers. (c) The aged. (d) Adult disabled and ill in hospital and confined to home. These priority classes represent at least 40% of the population in the pre-selected cities and include groups of people of particular concern to Civil Defence Health Services.

The remainder of this article will focus attention on health services problems and indicate progress to date. However, it should be emphasized that *health services represents only one of several civil defence services. Over-all co-ordination is essential and civil defence must also dovetail its plans with those of the Armed Services. A close working relationship with the United States is also important.*

PROBLEMS OF EVACUATION OF PARTICULAR CONCERN TO CIVIL DEFENCE HEALTH SERVICES (FIG. 1)

The rapid mass evacuation of populations will create major problems and many of these are of particular concern to civil defence health services. Fig. 1 illustrates the situation and lists problem areas under two headings: people and essential health facilities.

People

The maintenance of a reasonable standard of health in the general population will present a challenge to health workers, and success or failure could have an important bearing on the war effort. The sick and injured will have to be cared for and the evacuation of the critically ill will be most difficult. It must be remembered that many bedridden cases will be found at home, and lack of attention for this group could create chaos. Health manpower will be at a premium and must be deployed to provide an equitable distribution of personnel to Civil Defence and the Armed Services and for other civilian requirements.

*Director of Health Services, Department of National Health and Welfare, Ottawa.

EVACUATION PROBLEMS OF PARTICULAR CONCERN TO C.D. HEALTH SERVICES



Fig. 1.—Evacuation problems of particular concern to C.D. Health Services.

Essential Health Facilities

The evacuation of our large cities will mean the loss, at least temporarily, of many of our most important health resources. About 50% of the hospital beds in Canada, excluding those for mental disease and tuberculosis, are situated in these cities and new units will have to be established in reception areas. In addition, hospitals may be required for mass casualties. Medical and public health laboratories will need to be re-located, and blood depots, in most circumstances, are in vulnerable areas. Teaching resources will be important to the war effort, and other health facilities such as clinical and diagnostic centres and research facilities will all have to be considered as part of the survival plan.

SCOPE OF CIVIL DEFENCE HEALTH SERVICES (FIG. 2)

Before discussing the new look for civil defence health services, it is important to appreciate the broad scope covered by these services. Fig. 2 indicates that health services can be divided into

four major segments, namely medical services, public health, special weapons and medical supplies.

Medical Services

These include arrangements for non-casualty care as well as for casualties. Hospitals will be required for both, and emergency blood services will provide blood and blood products for those with the greatest need.

Public Health

This service will be concerned with the maintenance and restoration of public health. Communicable disease must be controlled. Sanitary supervision will be essential and will include the provision of a safe and adequate water supply. Public health and clinical laboratory facilities will be required. Mental health will be important, both as regards prevention of individual and group disturbances and as regards clinical arrangements for those requiring treatment. The dispersal of toxic materials in industry will present another problem, and industrial

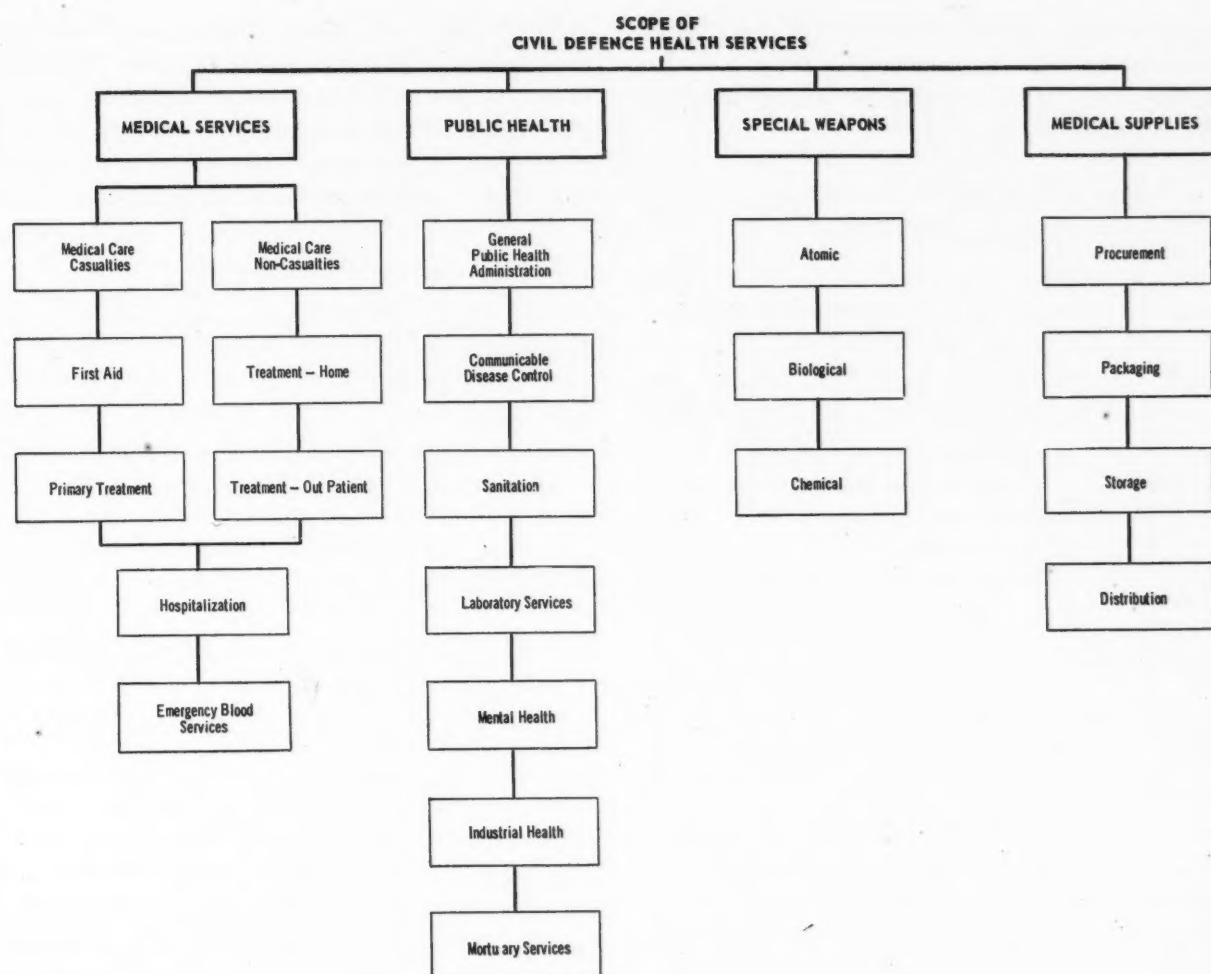


Fig. 2

medical services will form an important part of the health services organization. Mortuary arrangements will care for the dead.

Special Weapons

The primary reason for using atomic, biological, or chemical weapons is for their harmful effect on people. Health Services will advise on measures designed to prevent injury and minimize disability. Each of the weapons will provide health problems peculiar to the weapon of choice and many complex medical situations will have to be faced.

Medical Supplies

Medical supplies will have to be available in large quantities. The materials will have to be packaged so that they can be used with speed and efficiency. Decentralization of stores will be essential as speed of distribution to user sites will be of the essence. A well-organized health supplies system will be required at all levels.

THE EFFECT OF EVACUATION ON CIVIL DEFENCE HEALTH SERVICES PLANNING

The reappraisal of the civil defence health services program has been under way for the past year and a half. Many of the original working parties were recalled and new groups established. Some of the important points brought out in this re-assessment were as follows:

1. Basic Principles the Same

The basic principles in civil defence health services planning are: (a) peripheral mobilization of personnel, transportation and supplies; (b) central deployment of civil defence forces to the area of devastation; (c) mobile support from communities outside the disaster site. These principles were established for the small A-bomb and are still considered practical for the large weapon. However, larger areas of destruction will make it necessary to mobilize at greater distances from vulnerable situations and coverage will have to be provided for much greater

circumferences. Mobile support will need to be provided not only from adjacent areas but also from communities which may be several hundred miles from the disaster.

2. *Changes in Medical Services Arrangements*

(a) *Primary Treatment Services*

Primary treatment services consist of the personnel, equipment and transportation required for advanced treatment centres and for the casualty collecting unit which operates in front of each centre. These units are designed to provide first-aid and primary treatment as close to the disaster site as possible. Flexibility and mobility are stressed and the new unit is about half the size of that established for the smaller weapon. The detailed arrangements for primary treatment service are described in another article in this issue.*

(b) *Hospital Organization*

(i) *Increasing Emphasis on Improvised Hospital*

As mentioned earlier, a considerable proportion of our best hospital resources will be lost and satellite units will have to be established in reception communities. The Canadian improvised hospital is mobile and can be transported in one large trailer or four 3-ton trucks. It can be set up in two to three hours, either as an extension of an existing hospital or as a separate self-contained unit. It will be used to supplement facilities in reception areas for displaced populations and also for casualties. The major change in thinking with regard to the improvised hospital is that this new establishment will provide for the *continuing* hospital care of the sick and injured.

(ii) *Hospital Evacuation*

Hospitals in the pre-selected cities will be evacuated during Phase A. The rapid and almost complete evacuation of a large modern hospital is a difficult and complex procedure. Very little information was available on this subject and Canadian planners had to carry out a time-motion study to obtain essential information. This time-motion study took place in Vancouver on November 19, 1956, with the co-operation of St. Paul's Hospital and civil defence authorities at the various levels. It pro-

vided answers to many of the questions and demonstrated that a hospital of about 500 beds could be evacuated in four to five hours. It also demonstrated that careful and detailed planning is essential to success. The study is described in greater detail in another article in this issue.*

(c) *Emergency Blood Services*

Most of the blood depots associated with the Red Cross Transfusion Service are situated in vulnerable areas. New depots will need to be established in reception communities. These depots will be used as primary units* from which bleeding teams will go into populous areas to obtain blood. By decentralization it is hoped that a service can be established capable of collecting about 300,000 donations in 72 hours.

3. *Increasing Importance of Emergency Public Health Arrangements*

Emergency public health arrangements will be important not only in disaster areas but also on evacuation routes and in reception communities. The re-location of large segments of our population in smaller communities will lead to overcrowding and in many cases the essential health facilities will be inadequate. Measures to control communicable disease will have to be instituted and arrangements made to ensure a safe water supply. Other sanitary arrangements will be required for welfare centres and to supplement existing facilities. In addition, public health problems in disaster areas will require urgent attention. Our earlier planning for the disaster situation is still considered to be basically sound with certain modifications to provide for changes brought about by radioactive fallout.

4. *Special Weapons Arrangements*

The large atomic weapon not only has increased power, but also may create a serious fallout hazard covering thousands of square miles. Measures to minimize the effects of this residual contamination on people become an important health services matter. Prevention will be stressed, but plans also have to be made for treatment. The re-location of a considerable proportion of our total population in smaller communities also presents a situation which calls

*Primary Treatment Services by Dr. J. N. Crawford.

*Hospital Preparedness by Drs. W. D. Piercey and G. E. Fryer.

for a review of the probability of attack by biological and chemical weapons.

5. Medical Supplies

The original medical supplies program placed emphasis on the supplies required for casualties. It also relied on the availability of most of our hospital resources. A careful review of the situation supported the contention that the original supplies program should be completed and this view has been accepted. However, provision must now be made for the care of casualties and non-casualties in self-contained improvised hospitals. Health materiel will be required not only for the disaster site but also for use along evacuation routes and in reception communities. Equipment will be needed to detect hazardous situations created by special weapons and to prevent and treat their harmful effects.

PROGRESS TO DATE

While the reader may have gained the impression that civil defence health services planning in Canada is in a state of flux, it can be definitely stated that *most of the basic plans have been completed and we are at the stage of implementation*. This does not mean that full-scale civil defence forces will be mobilized at the present time. However, it does mean that basic units should be established. These units would be capable of dealing with peace-time emergencies and would form a basis for rapid expansion to meet civil defence war-time needs. This type of approach appears to have widespread support, as the units so formed are of moderate size and the problem of maintaining interest and activity is thus reduced to manageable proportions. *Therefore, the concept which is being accepted in Canada is that civil defence health services should be developed now to the degree necessary for peace-time emergency, and that these units would form the nuclei around which major war-time services can be built.*

This phased approach is being applied in the following way:

1. Primary Treatment Services

While over 800 of these units are required for Canada as a whole, initial development as

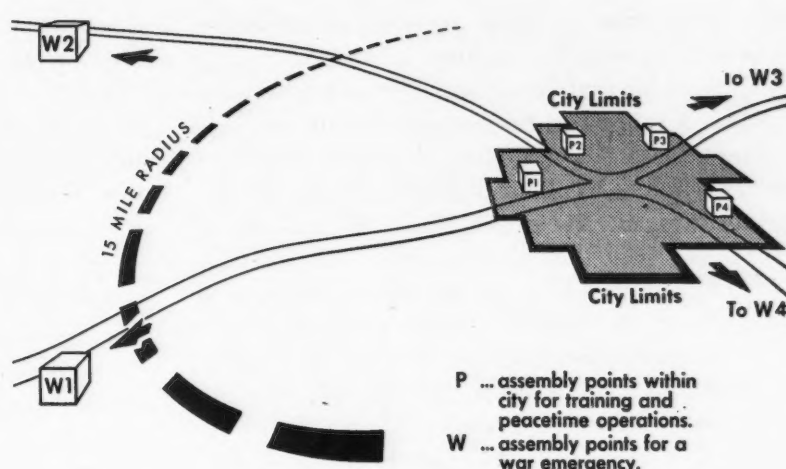


Fig. 3.—Plan for mobilization.

established by consultation with the provinces will be about 400. Nucleus units consist of a scaled-down version of the war establishment, but having all of the essential component parts. Alternate assembly points are chosen within built-up areas for peace-time operation and for training (Fig. 3). Operational equipment is being stockpiled and training units are available.

2. The Hospital Program

The hospital program is well advanced and has been developed by a series of regional Hospital Disaster Institutes. Representatives from over 250 of the larger hospitals in Canada have attended these institutes, which were conducted in both English and French. The hospitals they represent contain about two-thirds of the active hospital beds in Canada.

A second phase in hospital disaster planning is hospital evacuation. Evacuation problems were studied at a recent Vancouver exercise, and information is being compiled and will be made available to Canadian hospitals.

3. Professional Training

Physicians.—Over 400 Canadian physicians have attended courses on the medical aspects of disaster planning. These courses last five days and are held twice a year at the Canadian Civil Defence College at Arnprior. The Canadian Association of Deans of Medical Faculties were approached last year and approved in principle short courses of training for undergraduate medical students.

Dentists.—The physicians' course has recently been modified to include material suitable for dentists. It is hoped that this combined course

will strengthen a close working relationship between the two professions.

Nurses.—Several years ago, 1300 nurse instructors were trained in the nursing aspects of ABC warfare. These instructors, in turn, provided shorter courses to about 35,000 Canadian nurses. A more recent development was the training of 210 nurse educators so that they will be able to establish teaching programs in schools of nursing across Canada. Eight provinces have already established courses of training for undergraduates. The most recent training program for nurses provided material of particular interest to public health and industrial nurses and representatives from the Red Cross Society and the St. John Ambulance Association.

Pharmacists.—One hundred and twenty-five pharmacists have attended courses at the Civil Defence College at Arnprior. This program stresses the role of the pharmacist as a health supplies officer and also for emergency laboratory services. Civil defence training has also been introduced into the curricula for undergraduates in all schools of pharmacy in Canada.

4. Casualty Simulation

Casualty simulation is an art which has been developed to lend realism in the reproduction of simulated injuries and illnesses. It combines realistic make-up of injuries with the acting of symptoms accompanying such injuries in an appropriate setting. Canadian planners can be very proud of their pioneer work in this field. They have developed a useful tool not only for the training of lay personnel but also for teaching professional groups. An outstanding book has been prepared to assist with the teaching of the subject.* Courses have been held at the College and 150 persons trained as simulators. Thirty-two of these have received advanced courses qualifying them as instructors.

5. First-Aid and Home Nursing

Most civil defence workers will require first-aid training, and a special manual of instruction has been prepared to provide the type of first-aid teaching required in mass casualty care. It replaces standard first-aid text-books as far as civil defence is concerned and is entitled "Fundamentals of First Aid" by Dr. R. A. Mustard. It is available from the St. John

Ambulance Association and will be provided to civil defence trainees.

Home nursing training has also been revised to meet civil defence needs, and both the St. John Ambulance Association and the Canadian Red Cross Society provide courses which have been modified for this purpose.

6. Special Weapons

Five working parties dealing with different parts of the special weapons program have submitted general recommendations dealing with this area of planning. These recommendations will form the basis on which the special weapons program will be built.

7. Medical Supplies

Procurement.—Orders have been placed for about two-thirds of the supplies originally listed as essential to civil defence needs. Of this amount over 50% has been delivered and the balance should be in our hands during the next fiscal year. It is anticipated that orders will be placed during the coming year to complete the original program. These supplies include materials for: Primary treatment services (Casualty Collecting Units and Advanced Treatment Centres); back-up supplies for hospitals; clinical laboratory kits; portable public health laboratories; emergency bleeding centres; health aid haversacks; health units in welfare centres.

Packaging.—Most of the supplies so purchased will be packaged in functional units identified as to the area of the service in which they will be used. For example, advanced treatment centre supplies are identified for reception treatment, holding, evacuation and reserve supplies. This type of packaging allows the unit to be set up rapidly and to begin functioning in a minimum period of time. Prototypes have been developed for primary treatment services and considerable progress has been made with regard to hospital supplies. The remainder of the supplies will be packaged as bulk supplies to reinforce the original units.

Storage and Distribution.—Civil Defence has made arrangements with the Department of National Defence to act as the storing agency for these emergency supplies. They will, therefore, be stored in National Defence depots under the supervision of the medical services of the Armed Forces. An arrangement has been set up for the rotation of perishable stocks so that these

*Casualty Simulation—available from the Queen's Printer, Government Printing Bureau, Ottawa, at \$1.00 per copy.

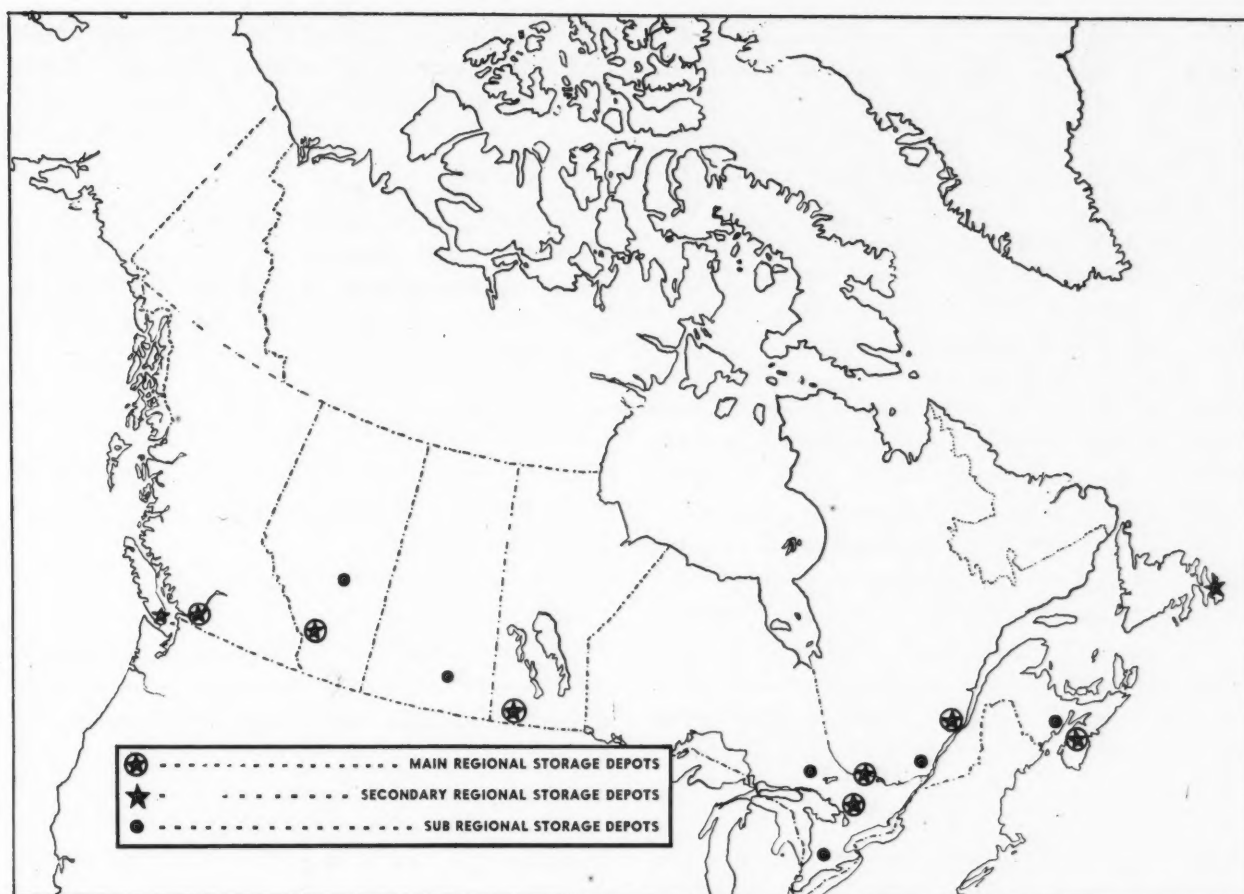


Fig. 4.

items can be used and replaced during their shelf-life. Regional depots will be established across the country so that the supplies will be readily available for any potential target. The proposed system for regional storage is illustrated in Fig. 4.

The main regional, secondary regional, and sub-regional storage depots will be under Federal supervision. Distribution beyond these points to provincial and local levels will bring the supplies under the control of the appropriate civil defence authorities at these levels. It is expected that the supplies will be kept in regional storage until a state of emergency justifies further distribution. Local distribution before the event will be particularly important for materials required immediately, such as supplies for primary treatment services, emergency bleeding centres and so forth. Training supplies are available and will be distributed through the provinces to units as they are established.

7. Progress in Provincial and Local Planning

The degree of progress in the development of civil defence health services plans at pro-

vincial and local level varies across Canada. Several provinces have made an excellent start on the development of the program and this is reflected in good sound basic planning in the various cities within these provinces. However, it must be admitted that in other provinces little if any achievement has been recorded. Where active provincial and local civil defence health services have been established, emphasis has been placed on the setting up of a good basic pattern for the area, with a review of potential resources. Training has been stressed to indoctrinate both professional and lay personnel. Hospital Disaster Institutes have been particularly popular and seem to offer the best approach to the development of realistic casualty services. Gaps in the program, in areas without plans, are making it difficult to arrange mutual aid and mobile support.

THE FUTURE

The stage of implementation will provide an acid test in the development of civil defence health services in Canada. During the planning stage, most of our problems could be solved by

enlisting the support of a relatively small number of experts. This principle was adhered to by the setting up of a series of working parties which advised on the details of the program. About 130 Canadian physicians were asked to serve on these working parties and the response was most gratifying. However, in implementing civil defence health services plans, reliance must be placed on the *active* support of a much greater number of professional and lay people. The emphasis now shifts from central planning to provincial and local implementation. Grass-roots development is essential. This does not mean that a large number of physicians will be asked to devote long hours to the development of this program. However, it does mean that a substantial number will be asked to assist with the formation and training of units on a moderate scale. This type of program should not call for the setting aside of any more than one or two evenings a month, in order to achieve a reasonable rate of development.

While present plans are being implemented, further steps will be taken to finalize the changes brought about by an acceptance of the principle of evacuation. These areas for future development are as follows:

1. *Improvised Hospitals*

The Canadian improvised hospital has been tested and a working party established to finalize the list of supplies. A staffing pattern will be developed and plans formulated for operation and training.

2. *Hospital Evacuation*

Information gained at the Vancouver exercise is being analyzed and will be prepared for distribution to hospitals across Canada.

3. *Emergency Blood Services*

Arrangements for this service are being worked out with the Canadian Red Cross Society and it is hoped that a start will be made on the setting up of this service in the very near future.

4. *Public Health*

A working party will be convened to set out a pattern for emergency public health arrangements. The sections in the Civil Defence Health

Services Manual dealing with water supply and sanitation have been revised and are almost ready for distribution.

5. *Training*

The present training program for physicians, dentists, nurses, pharmacists and casualty simulators will continue. In addition, it is likely that courses will be required for public health personnel.

6. *Special Weapons*

The details for a monitoring service will be developed and advice provided to reduce and treat harmful effects.

7. *Medical Supplies*

The extension of the original program is under review at the present time and recommendations will be made with regard to supplies for improvised hospitals, emergency cupboards in hospitals, public health requirements, and special weapons needs. Packaging and decentralization of stores to regional depots will be undertaken as soon as possible.

8. *Publications*

(a) *Civil Defence Health Services Manual*.—This manual is being extensively revised. Distribution is restricted to key personnel who are active in the civil defence health services program. Sections of the manual will be reproduced in pamphlet form for wider distribution.

(b) *Pamphlet on Hospital Disaster Planning*.—This material is being prepared at the present time and will be available for circulation to civil defence and hospital personnel. Either it will include hospital evacuation or a separate booklet will be prepared on this subject.

(c) *Civil Defence issue of the Canadian Nurses' Association Journal*.—Preliminary steps have been taken to arrange for an issue of *The Canadian Nurse*, similar to this publication for physicians. The objective is to have this material published and circulated to all nurses in Canada.

(d) *Health Supplies Manual*.—This manual is in draft form and should be completed in the next few months. It will be widely distributed to pharmacists across Canada and to civil defence authorities concerned with the health supplies program.

Success in the future will depend to a large extent on professional leadership. Leadership within the health professions should be provided by physicians.

SUMMARY

This article deals with a reappraisal of the civil defence health services program in Canada.

It outlines briefly the four phases of operational planning for civil defence, which includes the principle of evacuation for potential target cities. Progress in the development of the civil defence health services program is described and problems for the future are outlined. The importance of the physician in this development is stressed, with an indication that leadership by the medical profession is essential.

PRIMARY TREATMENT SERVICES

J. N. CRAWFORD, M.D.,* Ottawa

THE OBJECT OF THIS PAPER is to explain as briefly and simply as possible the organization and function of the primary treatment services for civil defence. A more detailed description may be found in the Civil Defence Health Services Manual published by the Department of National Health and Welfare.

The unit of the primary treatment services consists of two parts: (1) the casualty collecting unit, and (2) the advanced treatment centre.

THE CASUALTY COLLECTING UNIT

The casualty collecting unit is composed of a casualty collecting officer, who directs the operation of the unit, and three casualty collecting teams, each composed of a team leader, a deputy team leader, six first-aid workers, and 36 stretcher-bearers. This organization of the casualty collecting team will allow for the formation of three stretcher-bearer groups in each team, each group being composed of two first-aid workers and 12 stretcher-bearers.

The function of the casualty collecting unit is to collect casualties and to transport them as quickly and comfortably as possible to the advanced treatment centre, at which point the first professional medical care will be available. Transport of casualties will, in the first instance, be by hand carry of stretchers. Stretcher-bearer groups will work as close to the centre of an incident as they possibly can, bearing in mind

the hazards and obstructions which may exist in this region. At the most forward point in the line of evacuation which is possible in view of the nature of the roads and terrain, vehicles will be available to which casualties will be transferred, and thence transport of severe casualties will be by vehicle. At this point the team leader and his deputy will set up a casualty collecting post. Here the flow of vehicles to the stretcher-bearer groups and to the advanced treatment centre will be controlled, supplies to the stretcher-bearer groups will be replenished, and reinforcement supplies from the advanced treatment centre will be concentrated.

The function of the casualty collecting unit is purely one of first-aid and transport. There is no doctor or nurse on the strength of the unit. The supplies available to the unit are suitable only to the performance of this function. First-aid kits will be in the possession of the team leaders and deputy team leaders, the first-aid workers and the senior persons in each stretcher-bearer group. At the casualty collecting posts there will be a reserve of stretchers, blankets and dressings which may be replenished as required from the advanced treatment centre.

THE ADVANCED TREATMENT CENTRE

The advanced treatment centre is the first point in the chain of evacuation at which the casualty can receive anything in the way of professional medical care. The function of the unit is to receive casualties from the casualty collecting unit operating in front of it, to clear casualties rearward to better equipped hospitals, and to provide such treatment as is essential to casualties awaiting rearward evacuation.

*Director General of Treatment Services, Department of Veterans Affairs, Ottawa.

The location of the centre should be chosen with its function in mind. Obviously since provision of emergency treatment at the earliest possible moment is of the utmost importance, the centre should ideally be located as far forward as possible. This idealism must, however, be tempered by such practical considerations as accessibility by vehicle, protection from fire or radiation fallout, and the availability of adequate shelter for patients.

The personnel of the advanced treatment centre are: two medical officers, one administrative officer, two professional officers (dentists, pharmacists, veterinarians, etc., whose skill can be used as assistant medical officers), one supply officer, three transport officers, four nurses, 30 nursing auxiliaries and first-aid workers, two clerks, 12 stretcher-bearers, and one welfare worker. The duties of these various categories of personnel are fairly obvious from their titles, but are described in detail in the Civil Defence Health Services Manual.

The important thing to remember is that the advanced treatment centre is primarily an evacuation unit. Medical or surgical procedures undertaken there should be confined to those which if immediately applied may save life or will support the patient during transport to hospital. The supplies available in the centre are designed with this function in mind. Some allowance has been made for holding up to 100 patients for brief periods if this is necessary because of some failure in the line of evacuation, but such holding should be regarded as the exception rather than the rule.

Within the advanced treatment centre one of the medical officers will carry out the very important function of sorting casualties into categories for priority of evacuation.

With respect to treatment, it will be important that medical officers and their assistants should not try to do too much. Treatment should, in the main, be limited to such procedures as the control of hæmorrhage, immobilization of fractures, dressing of wounds and burns, and the treatment of shock. The hospital and not the advanced treatment centre is the place to attempt any major surgical repair.

ASSEMBLY POINTS

The question will doubtless arise as to how the units of the primary treatment services get

into position in the event of a disaster. In the preplanning for a disaster a number of locations outside the probable area of involvement will have been designated as assembly points. At these the medical supplies and equipment of the casualty collecting unit and the advanced treatment centre will have been stored in packaged form. In the period of alert or at the time of the disaster the personnel of the unit will assemble at these points. At the same time vehicles necessary for the operation of the units will also proceed to the assembly points. These vehicles are, for the most part, stake trucks. They will load up with supplies and personnel and proceed to the location in which the unit will work and which will be determined by disaster control headquarters. Once offloaded, these same vehicles will be utilized for the transportation of casualties.

FEEDING ARRANGEMENTS

No foodstuffs are included in the stockpile supplies for primary treatment services. The provision of meals to patients and staff is the responsibility of the welfare services. It is the duty of the welfare officer on the strength of the advanced treatment centre to maintain liaison with the welfare services and to arrange for the provision of food as best he can. It should not be expected that much more than hot drinks will be available in the primary treatment services for the first few hours of operation.

FLEXIBILITY

In the above description of the function of the primary treatment services a picture has been given of the orderly flow of casualties from stretcher-bearer groups through casualty collecting posts and advanced treatment centre to the hospital. The assumption has been made that sufficient personnel, sufficient transport and sufficient accommodation will be available to make this smooth operation possible. It is most improbable that in the event of disaster all these factors will be satisfactorily met. A good deal of ingenuity will have to be exercised and ad hoc arrangements will have to be made if the task of the primary treatment services is to be carried out in any reasonable way.

It is almost certain that the personnel assigned to the unit will be insufficient for the task. Local recruitment from whatever resources are

available should be carried out as required. For this purpose persons who arrive at the advanced treatment centre with minor wounds may be persuaded to help.

As one advanced treatment centre becomes clogged with casualties, it will be necessary to close it temporarily to further admissions and to direct new casualties to another nearby treatment centre. Such a manoeuvre will require the co-operation and control of the casualty control headquarters.

Vehicles will almost certainly be in short supply. Even if a primary treatment unit has all the vehicles allotted to it, these will likely be found to be inadequate to keep the unit functioning. Transfer of vehicles from a closed advanced treatment centre to an open one is to be expected. Additional vehicles, if available, may be supplied from casualty control headquarters.

In any operation such as this, an adequate system of communications would normally be regarded as a necessity. One of the transport officers on the strength of the advanced treatment centre will be responsible for maintaining liaison with the hospital to his rear and the stretcher-bearer groups to his front. It is not likely that he will have much equipment to

help him in this. A two-way radio-equipped taxi would be ideal, but these will be required in other parts of the casualty control operation. The communications officer will therefore have to rely largely upon messengers, most likely utilizing the drivers of ingoing and outgoing trucks for this purpose.

* * *

Readers of this description of the primary treatment services who have been familiar with the operation of a field ambulance in time of war will recognize certain points of similarity of organization in the two units. This is a matter which gives some reason for hope for the success of the civil defence unit system described, since the field ambulance is known to work under adverse field conditions. It is a simple enough matter to set down on paper an organization for a unit to do a theoretical job. It is quite a different matter to guarantee that this organization will be effective when it is put to work. It is suggested that casualty collecting units and advanced treatment centres should exercise with other elements of the civil defence organization at every opportunity. Only thus can the defects of its organization be revealed in time to take any useful corrective action.

HOSPITAL PREPAREDNESS

W. D. PIERCEY, M.D.* and
G. E. FRYER, M.D.†

ANY HOSPITAL, large or small, rural or urban, should be organized to meet a large influx of patients from a civilian disaster. The hospital as a vital community health centre cannot afford to neglect this responsibility if it is to discharge its complete obligation. While this always has been the case, because of the atomic age the hospital has a further duty of understanding its role in a national emergency. There is only one way in which a hospital can be ready to meet these obligations and that is through planning

in advance. This involves close team work between many groups, within the hospital and the community. Within the hospital there has to be close liaison among the medical staff, the administration, the nursing service and dietary departments, and to some degree with departments such as engineering, laundry, stores, purchasing and pharmacy. A hospital preparedness plan will not be complete until such groups as the local civil defence, police, fire and other municipal departments have been consulted and utilization of their services provided for.

While details will differ from hospital to hospital, much procedure in hospital disaster planning is standard. In an effort to assist and stimulate hospitals in their planning, a number of two-day meetings have been held throughout Canada. At these, each hospital has been represented by the chief of staff, the administrator,

*Executive Director, Canadian Hospital Association, Toronto.

†Medical Consultant, Civil Defence Health Services, Ottawa.

and the director of nursing. Model disaster plans, suitable for large and small hospitals, have been presented. During sectional meetings and group discussions new ideas have been exchanged and as a result there now exist several excellent Hospital Disaster Plans which are available to assist individual hospitals of all sizes.

What are some of the essential features in planning for hospital preparedness? First, the hospital board must be interested, and planning must proceed with the board's knowledge and active support. It must be realized by all groups that disaster planning is not a theoretical exercise but one that has a practical application. Of all the people responsible for the development of the plan, the hospital administrator is the one who should take the initiative in seeing that a committee on disaster planning is organized. This committee will have the over-all responsibility of ensuring that the various segments of the hospital develop their particular part of the plan and that the various facets fit together in one co-ordinated whole. The purpose of a hospital preparedness plan is to make certain that the hospital can accept a large number of casualties on short notice, that they are sorted speedily and given adequate and prompt treatment.

Having set up the nucleus committee on planning, the administrator will then estimate potential hospital expansion, assign areas of responsibility with other staff and see that plans are completed for the evacuation of patients in hospital at the time of disaster and arrange for policing of buildings and grounds. The development of hospital emergency orders, the application of training principles and practices for personnel, the provision of an information centre for both the press and relatives, the development of standing hospital emergency orders, are all major areas of essential planning. Administrative arrangements also have to be completed for the admission and inflow of casualties; records and documentation; care of valuables; identification of hospital personnel reporting to the hospital, and extended mortuary arrangements.

The active participation of the medical staff through various committees is essential during the plan's development. The establishment of a physicians' pool within the local medical society is important in the early planning. This pool

will contain the names of both active and inactive doctors and should be checked at least at six-month intervals. The person in charge of this pool should remember that physicians must be so assigned as to prevent overlapping of medical staff in other hospitals and keep in mind that some doctors may be required at the disaster site. The estimation of additional medical staff required in times of disaster, the reallocation of clinical areas in the hospital, and the assignment of doctors from the physicians' pool as members of various teams required either within their own area or in some other community also must be considered. An estimate by the medical staff of patients in hospital capable of being discharged is important. During planning it must be recognized that under emergency conditions there will be a suspension of the normal doctor-patient relationships and that it will be necessary to have standing emergency treatment orders. These must be discussed at medical staff meetings and the policy approved by the medical staff as a whole.

The department of nursing has an integral part to play in hospital disaster planning. Not only must the director of nursing be on the nucleus committee from the start, but early participation of supervisory and head nurse staffs is essential. Regular meetings of the nursing subcommittee should be held. If a register of nurses has not been established in the community, this should be done through the local Nurses' Association to ensure individual assignment of nurses without overlapping between hospitals. If it is found that there are not enough nursing personnel in the hospital, the need for assistance from a mutual aid or support community should be stated. The planning for reallocation of clinical areas to meet the disaster needs, the reassigning of existing staff to clinical disaster and non-casualty areas, and establishment of a routine for tagging and discharging patients designated by the medical staff are all matters in which the director of nursing must be consulted and kept accurately informed as the plan develops.

In estimating the additional nursing staff required in time of disaster, including graduate nurses, auxiliary nursing personnel and volunteers, it will be necessary to consider plans for a moderate and a mass disaster. It will be of great assistance to use various insignia to identify various levels of nursing and auxiliary

personnel. Provision for a cupboard containing emergency supplies is an important part of the disaster plan.

Three methods can be used to ensure sufficient space for casualty accommodation:

1. The evacuation of all hospital patients who can be discharged to their homes or elsewhere.
2. The expansion of beds in areas which ordinarily have beds.
3. The setting up of beds in hospital areas not usually used for treatment.

In evacuation planning the degree of proposed evacuation is important and this can be facilitated if patients are designated to fit into one of four categories while they are in the hospital. The results of several hospital appraisals show that all patients in a hospital can be divided into the following categories:

1. *Mobile*.—These people are up and around and can be moved with the least amount of disturbance.
2. *Mobile with aid*.—This group requires some supervision but need not be evacuated prone.
3. *Stretcher cases*.—There are two sub-groups to this classification: (a) Those that require only stretcher transportation. (b) Those that require special attention, such as fracture cases in fracture frames or those recently operated upon.
4. *Dangerously ill*.—Usually from 3 to 5% of the hospital population which could not be moved.

The area for reception of casualties should be chosen carefully. It must be readily accessible to vehicles bringing in the casualties and large enough for the reception team to carry on their work speedily and effectively. Some casualties will come by ambulance, others by trucks and private motor cars. Ideally, one requires a ground floor area where the vehicles can approach readily and discharge their casualties quickly and thus keep a steady flow of traffic. In many hospitals the best area possible will be the outpatient or emergency departments. Close co-ordination between medical, nursing and clerical staff assigned to the reception area is important. This co-ordination is best accomplished by someone familiar with the whole hospital and staff. He is designated the "reception officer" and carries considerable responsibility. Under him will be the medical staff

receiving unit, nursing team, clerks to assist with statistical information, and stretcher carriers. Their function is to expedite the reception, documentation, and admission of casualties. Casualties are sorted as to injuries and designated for specific treatment areas. Usually they are divided into the following major categories. The first consists of those requiring immediate surgical or medical treatment. Usually three sub-groups are given under this heading: (a) Those requiring surgical care and in fit condition for immediate operation are sent to the operating room. (b) Those requiring surgical or medical care but in severe shock will receive initial treatment in the sorting area and then will be forwarded to a resuscitation area. (c) Burn cases will be sent to another designated area. These three sub-divisions of group number one will be very important. They are real emergencies and require immediate and urgent treatment. The purpose of a disaster plan is to bring good medical attention to them quickly.

The second group are those who require hospital admission but whose need of medical or surgical attention is not immediate. These are sent directly to designated ward areas. Among this group there will be a number of psychiatric cases to be segregated on special wards. In the third group are casualties requiring first-aid treatment only. They do not need to be admitted and are sent to another area, treated and sent home.

An adequate reception area is an important part of the plan for hospital casualty care. Not only must the area itself be well chosen, but the members of the medical staff team who act in the area must be selected with extreme care. This is the area where the medical staff's best surgical and medical experience and judgment is required. This is necessary for proper triage and the prompt removal of casualties to the various treatment areas. In planning the treatment of casualties, responsibilities are divided among the chief of surgery, the chief of medicine, the director of laboratories, and the radiologist. The chief of surgery is usually responsible for the following seven units: (a) the receiving unit, (b) the first-aid unit, (c) the burn unit, (d) the operating room teams, (e) surgical casualty wards, (f) anaesthetic units, (g) surgical units. The chief of medicine is responsible for five areas: (a) evacuation unit, (b) resuscitation unit,

(c) psychiatric unit, (d) non-casualty patients, (e) medical interns. The director of laboratories has the following three areas under his jurisdiction: (a) emergency laboratory services, (b) blood and plasma services, (c) morgue service. The radiologist is responsible for emergency x-ray service. The allocation of individual members of the medical staff to the various areas is decided by a medical committee or the chief of staff.

During an emergency everyone will be working at top speed, maybe for some 24 to 36 hours. In developing a hospital preparedness plan it is therefore essential for standard methods of treatment to be decided in advance by the medical staff in any particular hospital.

A hospital preparedness plan as outlined will serve any hospital well in meeting emergency situations in its own area, but because such a large number of our hospital beds are situated in metropolitan areas which might be untenable in time of national emergency, additional plans have to be prepared for these metropolitan hospitals, which include rapid evacuation and re-establishment in satellite units.

Civil defence planners, recognizing that an acute shortage of beds might arise after an international incident, have developed an improvised hospital unit of two hundred beds which can be used in two major roles:

1. In the care of mass casualties, probably on a continuing basis.
2. In the medical care of non-casualty cases in the reception area either as an extension to an existing hospital or as a separate unit.

The feasibility of using the unit as an extension of an existing hospital has been tested and the general principles declared sound.

Before a hospital can progress to this second stage of community planning it must have a workable plan for local disaster with its premises and staff intact. It is then an easy progression to the more involved plan of evacuation for both patients and staff.

Disaster planning for the larger incident falls naturally into the same three areas of administration, medical staff, and nursing service, found so essential in the production of local disaster plans.

In both cases, hospitals will be the focal point for civil defence casualty services and for the medical care of seriously ill non-casualty cases.

Hospitals cannot, however, operate in a vacuum and both situations call for active co-operation with the civil defence organization. No hospital can develop either plan without being aware of the local arrangements with regard to such areas as transport and communications, or the over-all Canadian plan for the provision of medical supplies.

Very few hospitals will be called upon to put their plan into action within six months or a year of its development and some may not have to activate the plan for many years. The question arises—how is the plan to be kept alive with changing personnel? A good disaster plan can quickly become obsolete unless a planned program is laid down to keep the plan alive. A few suggestions that will assist are: regular hospital staff conferences, systematic recheck of paper plans, orientation of all new staff and training programs for hospital employees and volunteers, liaison with other hospitals and agencies regarding local arrangements within your plan and alternating persons responsible for various areas so that many may become familiar with details, the carrying out of sectional exercises and periodic checks on the plan by civil defence authorities and representatives of Civil Defence Health Services. All these are important facets to ensure that the plan is kept alive and up to date.

RADIATION EXPOSURE

The increasing interest in the application of nuclear reactors to civilian industry indicates that radiation safety principles will in the future become a matter of widespread interest to the medical profession. Curiosity and possible public apprehension will require that all physicians have some basic knowledge of the field. More specifically, the increase in the percentage of the population exposed routinely to ionizing radiation may lead to confusing diagnostic and therapeutic situations. As more and more emphasis is placed on controlling lifetime exposure to ionizing radiation, radiologists, in particular, must be aware of the exposure patterns experienced by personnel employed in nuclear-power plants. Physicians associated with the practice of industrial medicine will play a large part in establishing industrial radiation safety codes and advising in on-the-job situations. Traumatic surgeons will find contamination by radioactivity a new factor to cope with in industrial surgery. Pre-employment routine physical examinations in this field will present important problems to the dermatologist, ophthalmologist and haematologist who may be asked to advise on potential risk arising from chronic dermatitis related to skin contamination, lens opacities and departure from normal haematology in personnel who are prospective employees in this field or who have already received significant industrial exposure.—J. H. Ebersole, *New England J. Med.*, 256: 67, 1957.

THE ROLE OF ORGANIZED MEDICINE IN CIVIL DEFENCE

A. F. W. PEART, M.B.E., M.D.,
C.M., D.P.H.,* *Toronto*

EVERY PHYSICIAN IN CANADA, by virtue of his training and dedication in the field of medicine, has a special responsibility in the community for the care of the sick and disabled. This responsibility has been accepted through the years by members of the medical profession who have provided their skills in many major conflicts and disasters, and in so doing have rendered the highest quality of medical care known in their time. In present times science and technique have reached a degree of excellence hitherto unequalled in the history of medicine.

Since World War II it has become obvious that modern science and technology have advanced to the point where cities and towns on the North American continent will not be safe in the event of a major enemy attack. The availability of hydrogen bombs, which have unbelievable powers of mass destruction, has added to the necessity for mass preservation through civil defence organization. The purpose of this article is to outline how medical societies and individual members of the medical profession can play their part in organizing to meet a national emergency. Elsewhere in this issue will be found details concerning the types of casualties expected from nuclear bombs, as well as of the organization developed for the protection and treatment of civilian populations.

Civil defence authorities are now placing emphasis on self-help, which means that every person in target areas should know what he or she should do to protect self and family in case of impending attack or the dropping of a nuclear bomb. Medical and ancillary medical personnel should be similarly informed, but in addition should know what their special role will be in the care of the sick and injured in any disaster program. As they will be key persons in such an emergency, it is most important that they should be very clear about where they are to go and what they should do under these circumstances.

Thirteen target areas have been defined in Canada and are scheduled for evacuation in time

of national emergency. These include Montreal, Toronto, Ottawa and Hull, Windsor, Niagara Falls, Halifax, Victoria, Vancouver, Hamilton, Winnipeg, Edmonton, Quebec City and Saint John, New Brunswick. Organization for the care of mass casualties is therefore based on these target areas. However, civil defence organization is required not only in the target area but also in reception areas, which include the smaller cities, towns and villages.

The responsibility for the organization of civil defence services rests with local municipalities. Some municipalities have already appointed civil defence co-ordinators who are responsible for preparing the local population for civil defence. Where no appointment has been made, the responsibility for organizing civil defence rests with the mayor or reeve and local municipal council.

MEDICAL RESPONSIBILITY

It is the responsibility of the municipal civil defence co-ordinator or his medical representative to organize a meeting consisting of representatives from medical societies and hospitals as well as public health personnel, medical officers of active and reserve armed forces and others, and with this group develop a medical service that could be put into effect in case of an emergency. This initiative to organize should come from the municipal governments of target cities as well as those smaller cities, towns, and villages in reception communities. However, medical societies and physicians as responsible citizens of the community might stimulate the development of civil defence health services if adequate organization has not taken place in a community. The medical health officer is usually the medical representative of the municipality who is responsible for organizing medical services for a civil defence plan. Provincial civil defence personnel and C.M.A. Committees on Civil Disaster may also participate in the organization, and are in a position to co-ordinate the plans in target cities with those in adjacent municipalities.

Through organizational meetings a civil defence health service should be established in target areas as well as in reception areas. There may be several small cities, towns or villages in a reception area.

*Assistant Secretary, Canadian Medical Association.

The following appointments should be made:

1. A medical controller who would have the over-all responsibility for medical, hospital, public health and other arrangements for civil defence and who would co-ordinate these services. He may be a physician in public health or a practising physician who has administrative ability.

2. Deputy or assistant controllers who would organize and supervise specific medical and health services, such as public health, medical treatment, hospital services, nursing services, dental services, supplies and equipment, transportation and communication, and mortuary services.

In target areas sufficient personnel should be selected on a geographical basis to allow for the possibility that medical personnel may be casualties in a bombing attack. Non-medical personnel will also be required to supplement the medical staff. Dentists, pharmacists, veterinarians, laboratory technicians and other professional health workers will be valuable members of the planning team.

The extent of this basic organization and the number of personnel required to administer it will depend on the role that each city, town or village is expected to play in time of emergency, and will to some extent depend on the distribution of physicians and other health personnel in the area.

When the headquarters has been established, it will be up to each service to organize a staff, identify buildings for possible use, and plan for supplies and equipment and other requirements for an emergency service, recognizing that much improvisation will be necessary if a disaster occurs. The organization of the services outlined above might best be achieved through constant liaison between medical controllers and deputy controllers of target cities and those in outlying reception centres. Assistance from civil defence authorities will be needed to define the boundaries of reception areas so that medical societies within such areas can formulate an organizational program.

HOSPITAL SERVICES

The deputy controller of hospital services should organize his services along the following lines.

Hospitals in target areas should develop an evacuation plan to withdraw from the city to

reception areas (50 to 100 miles from target areas). Hospitals in reception areas, on the other hand, should plan to extend their hospital facilities using existing and emergency accommodation. Specialist personnel from target areas may be required to supplement medical staffs of emergency hospitals. It is the responsibility of the hospital staffs in target areas to identify those essential members of the medical staff who would be evacuated with the hospital to a temporary location in the reception area. The latter would largely be highly trained specialists who would constitute the nucleus for the more advanced treatment of casualties evacuated from the target area. The remainder of the medical staff would be allocated to advance treatment centres or additional emergency hospitals. Provision should be made for sufficient emergency hospitals in outlying areas to meet the expected need for current sickness and accidents as well as casualties from bombing. More detail about the role of hospitals in the civil defence program will be found elsewhere in this issue.

MEDICAL TREATMENT SERVICES

The deputy controller of medical treatment services should make provision for the treatment of two broad groups of casualties: firstly, the usual types of sickness and disability found in any population, such as obstetric cases, fractures, current infections, and appendicitis; and secondly, those injured by a nuclear bomb. It is also expected that fear, confusion and shock will result in an increase in mental and psychosomatic conditions, and that the incidence of communicable diseases will also be increased owing to the crowding of large numbers of people into emergency housing, where sanitation, food and clothing will not be ideal. It is therefore important that sufficient provision should be made in reception areas to treat the ills of large numbers of displaced persons, housed under improvised conditions. If there is insufficient warning before a bomb is dropped, medical treatment teams in reception areas would need to turn their attention to the receipt and treatment of large numbers of bomb casualties.

In organizing medical treatment services, medical and ancillary personnel (nurses, dentists, pharmacists, and others) should be allocated to: (a) advanced treatment centres, (b) emergency hospitals, and (c) other health duties, so that every qualified person is aware of his or her

responsibility. (See the article in this issue entitled "Primary Treatment Services".)

Casualties will be collected and first-aid treatment given by casualty collecting units located in the suburbs of the target areas. They should be organized in conjunction with advanced treatment centres. Their function is to collect, give first-aid to and transport casualties from the bombed areas to advanced treatment centres. They will therefore be located as closely as possible to the damaged area as circumstances permit. Advanced treatment centres are the first centres where medical personnel will work. Here, initial treatment will be carried out with emphasis on emergency surgery and speedy evacuation to more specialized facilities in the emergency hospitals in reception areas. The location of casualty collecting units, advanced treatment centres, and emergency hospitals should all be identified in the planning stage. These assembly points will be located within the periphery of the city limits as well as in the outlying districts (outside a 15-mile radius from the city), so that if a bomb is dropped not in the centre of the city but in a suburb, some of the assembly points at the opposite end of the city may be used as well as those outside the city. Those assembly points in the city may also be used for training purposes and in case of a more localized disaster. Provision has been made for supplies and equipment to service treatment centres located at designated points.

(See article entitled "A New Look At Civil Defence Health Services With Progress to Date".)

PUBLIC HEALTH SERVICES

Public health services take on an added importance when one considers the possibility of mass disease problems resulting from the movement of large populations where inadequate accommodation exists. The deputy controller of public health services should plan for the care and control of increased numbers of cases of communicable diseases and psychiatric cases and for the installation and supervision of improvised sewage disposal and water supply services, food supervision, housing and a possible heat supply for temporary housing facilities.

It is expected that existing public health personnel will form the nucleus of the public health service in a civil disaster, but their ranks will

need to be supplemented because some regular personnel may be disabled during the attack, and also in view of the extraordinary demand that will be placed on communicable disease control and the inspection of sanitary facilities.

Additional health personnel may be drawn from federal and provincial government health departments, sanitary engineers, veterinarians and personnel with experience in sanitary arrangements. Such additional personnel should be earmarked for duties in public health in case of emergency.

MEDICAL SUPPLIES AND EQUIPMENT

An outline of the provision of medical supplies and equipment is contained elsewhere in this issue, but the local planners should know what bulk civil defence supplies are available in their area, where they are located, and also the location of potential supplies in medical and surgical supply houses. Hospitals and drug stores may have to provide medical supplies as a temporary measure until bulk supplies can be obtained from organized sources.

COMMUNICATIONS AND TRANSPORTATION

The effectiveness of any civil defence plan will depend on a satisfactory two-way communications system between the medical controller at headquarters and the various treatment centres and hospitals in the area. By free communication, supplies, personnel and transport may be provided where they are most needed. Emphasis should be placed on the availability of transportation for the evacuation of the sick and injured; rapid transportation will be necessary for effective care of casualties. Other branches of the civil defence organization are concerned with these services, but medical organizers should themselves ensure that such services are adequate to meet any eventuality.

ANCILLARY PERSONNEL

No medical emergency could be adequately handled without the essential services of nursing personnel as well as specialists in the fields of dentistry, pharmacy, veterinary medicine, laboratory technology and many other professional and semi-professional workers to deal with casualties, sickness, or health supervision. Services should be established for the utilization of all of these professional groups and their allocation to posi-

tions for which they are best suited because of aptitude or experience. Elsewhere in this Journal the probable roles of these specialized persons are discussed.

OPERATION CIVIL DEFENCE

Once the organization has been established, the question arises, how will this organization work? Within the bounds of reasonable planning, it will not be possible to organize for every eventuality. Therefore, the organization should be flexible enough to accommodate to the situation before or after a bomb drops. The effectiveness of the organization will, to a large extent, be dependent on the amount of warning given before an attack occurs, so that complete or partial evacuation may be accomplished.

In large cities (target areas) if sufficient time is allowed for evacuation before an air attack, such as a declaration of war or hostilities elsewhere, a Phase A or pre-attack evacuation plan will be possible. This will allow the withdrawal of priority and non-essential persons such as invalids, hospital patients, school students and staffs, young children and mothers, expectant mothers and some others. These persons will proceed to reception areas in surrounding smaller cities, towns and villages. This will take place by rail, bus, privately owned motor vehicles and any other transport available. Essential medical and nursing staffs of hospitals will accompany the patients in the evacuation process. It is therefore important that every hospital in target areas have evacuation plans and identify those essential people who will constitute the nucleus of an effective medical and nursing staff in the new emergency quarters outside of target areas.

In Phase B of the evacuation plan the remainder of the population will be evacuated. This will be carried out when a warning is received that an attack may occur. The group will include the essential labour force of the population and will largely be composed of men. They will probably move a somewhat shorter distance to surrounding cities, towns and villages, 25 to 50 miles away. In other words, everybody moves out of town if sufficient time is allowed for this process.

If an attack is imminent before complete withdrawal of the city, everyone must take shelter in the nearest basements available. If an attack

occurs while people are in their homes, they of course will go to their basements where they will have provided emergency food, clothing and essentials for such an emergency.

Under such circumstances, after the explosion of the bomb, those doctors who are physically able would immediately report to the nearest advanced treatment centre. Such centres should be identified in advance and would include schools, factories or any suitable building in good enough condition to serve as an emergency treatment centre. All doctors should be advised what buildings would be used in such an emergency and where they should go under these circumstances. If these buildings have been destroyed, doctors should then go to the next nearest advanced treatment centre in the periphery. Those doctors who have been allocated to emergency hospital sites should proceed there.

SUMMARY

To summarize the above, every doctor in a target area should make advance preparations to protect himself and his family against a nuclear explosion. He should also be familiar with the literature in his own field, know where he fits into the civil defence picture, and be perfectly clear what will be expected of him: (a) if evacuation is possible well in advance of an attack; and (b) where a pre-attack evacuation is not possible and an attack comes unexpectedly.

If sufficient time is allowed for the evacuation of a target area, he will withdraw with the hospital as an essential member of a hospital staff, or he will be allocated to an emergency hospital or a suburban advanced treatment centre which will be in a school or other building. As far as possible doctors should be assigned to advanced treatment centres nearest to their homes. Medical personnel assigned to advanced treatment centres should meet together with their colleagues and ancillary health personnel to discuss detailed plans about operating their treatment centre, in case it should be necessary to do so. The staff should be organized, areas of responsibility defined and administrative appointments made. Some physicians, particularly specialists, will be required to take up stations in mutual aid or reception areas situated 25, 50 or 100 miles from the target area to assist in the care of evacuated civilians, staffing of emergency

hospitals or the control of public health services. Whether a doctor is assigned to one role or another, he should be familiar with it. Sufficient appointments should be made to allow for the possibility that some doctors will be casualties during the attack.

Civil defence authorities should meet with representatives of medical societies, public health personnel and hospital staffs, as well as members of the armed services in their area, to devise a plan so that every doctor is well acquainted with the role he is to play in a civil disaster. In target areas the plan will be for evacuation and emergency treatment. In mutual aid areas or reception areas the organization will be one for receiving large numbers of dis-

placed persons from a target city as well as the treatment of mass casualties. Those responsible should know where they can obtain quantities of medical supplies to meet the needs.

The federal government has arranged for the provision of medical supplies, training pamphlets and organizational assistance to establish suitable programs. The provincial government is willing to assist in co-ordinating programs between target areas and outlying municipalities. The armed services, including the active force and the militia, will also be available to give assistance in organizing a civil defence program in your area. In case of an emergency, the armed services will do their part in providing medical supplies, communications and transport.

THE ROLE OF THE MEDICAL SERVICES OF THE ARMED FORCES IN CIVIL DEFENCE

BRIGADIER K. A. HUNTER, O.B.E.,
C.D., M.D.,* *Ottawa*

THE NEED FOR ORGANIZATION and plans for Canadian civil defence has been evident for some years. This being the case, officers and officials of the Department of National Defence have, from the beginning, been prepared to assist the Civil Defence Division of the Department of National Health and Welfare in the important and monumental task of civil defence planning and organization. The Civil Defence authorities, for their part, have accepted the help of D.N.D. with the result that, at the present time, the two departments are co-operating most enthusiastically and effectively in this task.

In general terms, at the present time, it is the accepted policy that the Canadian Armed Forces will provide assistance to the civil defence authorities in war in the same manner as assistance is provided for any type of emergency or disaster in peace. The Forces will be prepared to give immediate assistance to civil defence or possibly assume temporarily its functions,

in the event that the civil defence organization has been temporarily rendered incapable of carrying out its tasks.

The responsibility for employing the Armed Forces in aid of civil defence has been delegated to the Canadian Army. The Royal Canadian Navy and Royal Canadian Air Force will assist the Canadian Army in carrying out this responsibility, in accordance with their ability, and on request of the Canadian Army.

In order that the Forces may be able to provide this assistance, prescribed plans have been prepared by appropriate service authorities; liaison officers have been accredited to civil defence staffs at various levels; units of the Armed Forces are participating in civil defence exercises and planning activities; and the training of members of the Armed Forces has been modified where necessary, to adjust such personnel to the civil defence assistance role.

The foregoing remarks outline the general relationship of the Armed Forces to civil defence. In the medical field one can say that co-ordination of Armed Forces Medical Services efforts with those of the medical branch of the civil defence organization is particularly good.

When, several years ago, Civil Defence medical authorities began to make their plans they recognized the fact that in the Armed Forces Medical Services there was a considerable body of experience relating to the handling of mass casualties and to the planning of operations in this

*Coordinator of Medical Services, Department of National Defence.

field. Consequently, experienced Armed Forces medical officers were requested to serve on the Civil Defence medical planning panels and committees. This policy has continued and has been mutually advantageous to the Civil Defence and Armed Forces medical branches.

Fairly early in planning it became apparent that if a situation developed in which mass casualties would have to be cared for, the provision of medical and surgical equipment, pharmaceutical supplies, dressings, bandages, plasma volume expanders and so forth would be a major problem. It was obvious that these materials must be readily available for despatch to the scene of the disaster in an organized, co-ordinated and rapid manner. Since potential targets are scattered across the whole breadth of Canada, it was obvious that one central depot would be insufficient for this purpose.

As a result of examination of this situation by Civil Defence and National Defence medical authorities, a satisfactory solution was found. This solution involved the formation of an Interdepartmental Committee for Emergency Medical Supplies. The committee is chaired by the D.G.M.S. (Army) under whose direction the existing chain of Armed Forces Medical Equipment depots is operated. The Department of National Health and Welfare (Civil Defence branch) and the Department of Veterans Affairs are represented in this membership.

The Interdepartmental Committee is charged with the task of arranging for the provision of adequate stockpiles of medical supplies and equipment for Armed Forces and Civil Defence requirements; for the provision and safeguarding of adequate and strategically located warehousing for these supplies; and for the rotation of perishable materials in such a manner as to ensure that materials with a short shelf-life are removed from the stockpiles before becoming outdated.

Since the tasks of Civil Defence and Armed Forces Medical Services are similar in nature—i.e. the provision of care for the sick and wounded—and since the strategic distribution of supplies as required by both organizations is very similar, this method of organization of medical supply stockpiles is proving both economical and effective. The Armed Forces Medical Equipment depots are being utilized for the storage of the medical supply stockpiles of both organizations.

The Armed Forces Medical Services and Civil Defence organizations are co-operating extensively in a variety of other ways.

The Directors General of Medical Services and their representatives attend civil defence exercises and participate both in exercise procedures and the conferences at which the lessons resulting from those exercises are assessed. The D.G.M.S. (Army) has for three years included in his annual three-day exercises for senior Army medical officers a period devoted to civil defence and the Armed Forces' role in co-operation therewith.

Armed Forces medical officers attend as students all courses for medical personnel given at the Civil Defence Staff College, Arnprior, Ont. In addition senior administrative and specialist medical officers of the Armed Forces lecture at these civil defence courses in their appropriate fields of special knowledge or experience. The areas in which the Forces have been able to contribute most effectively are ABC (atomic, biological and chemical) warfare; the treatment of burns and wounds; and the organizational and administrative problems involved in the handling of mass casualties.

A particularly good example of the inherent value of co-operation between Civil Defence and Armed Forces Medical Services was provided recently in a demonstration conducted at the Civil Defence Staff College, Arnprior. Civil Defence authorities had designed a compact two-hundred bed field hospital as a prototype for stockpiling. The equipment and supplies for this hospital were packaged for ease of transportation and so marked that the hospital could be readily set up, on a departmental basis, either in tentage or in such buildings as might be available.

For the exercise Civil Defence provided the packaged hospital equipment and some personnel. A Regular Army Field Ambulance provided vehicles, tentage and trained medical personnel. The combined efforts of the two organizations resulted in a demonstration of the speed with which an emergency hospital could be provided in or near a devastated area if preliminary planning had provided for such contingency.

The medical task, if casualties in immense numbers occur in a matter of seconds as a result of attacks by fission weapons, staggers the

imagination. It is evident that every available medical resource will then be required to meet the situation. The medical services of the Armed Forces, both regular and reserve, have had special training in this field of medical endeavour and will be able to provide a significant

contribution to the civil defence solution of the problem. It can be taken as an accepted fact that the Armed Forces Medical Services will provide every possible assistance if, unhappily, such assistance should ever be required.

EARLY MEDICAL MANAGEMENT OF MASS TRAUMA

LT.-COL. A. C. DERBY, R.C.A.M.C.,*
Kingston, Ontario

THE ENEMY will explode a nuclear weapon over one of our strategic cities or in the field of battle. From the standpoint of treatment, there will be a number of differences between these sites of explosion. Traumatic cases will probably be more numerous in the city explosion, because of the greater hazard from falling buildings. In the field we will have to deal with the injuries produced by conventional weapons as well as those produced by a nuclear weapon. Finally there will be an organized scheme of treatment and evacuation in the field while, in the city, some type of untried civil defence organization will be the only method of triage. Whatever type of treatment and evacuation is used will, of necessity, be based on the military because only in the military is there any background and experience in the successful treatment of large numbers of casualties.¹

PRINCIPLES AND PRACTICES OF WAR SURGERY

It would, therefore, not seem out of place to review briefly the principles and practices of war surgery before attempting to detail the treatment of the wounds expected in a nuclear explosion.

War surgery is a branch of traumatic surgery but the requisites of a military surgeon go beyond a thorough knowledge of trauma, for he must be cognizant of the particular problems of treatment and evacuation in the field as distinct from the treatment of the traumatic

case in the casualty ward of a civilian hospital.² He must sacrifice his individuality to a greater or lesser degree and adhere rigidly to certain tried and proven principles of war surgery. On the other hand, he must be flexible enough to be able and willing to modify ruthlessly his surgical approach when the tactical situation demands.

Specifically, it is the problem of the military surgeon that, under adverse circumstances, he must treat large numbers of casualties and extend surgery to them within the "golden period". This "golden period" is an arbitrary period during which surgery is extended to casualties before a potentially infected wound is converted into an infected one.

How is this possible?

By establishing first-aid and evacuation facilities close to the forward defended position, so that large numbers of casualties can be brought back as quickly as possible and in the best condition possible to surgical care.

This, in turn, means the organization of surgical units as far forward as is safely possible, so that the lines of evacuation can be reduced to a minimum.^{3, 4} It will readily be appreciated that these hospitals must be sufficiently mobile to follow the most fluid type of warfare; to this end, equipment and supplies must be kept to a minimum.

The sacrificing of equipment to facilitate mobility will be reflected in a limitation of post-operative bed strength, necessitating larger and relatively fixed hospitals in the rear for early evacuation. Finally, hospitals will be needed in the "zone of interior", like our D.V.A. and military hospitals in Canada, for definitive care to the more seriously wounded. It will be appreciated that many of the minor wounded may be ready for duty after treatment at base hospital.

*Surgical specialist, Kingston Military Hospital, Kingston.

It will now be seen that there are four distinct levels of treatment in military surgery, each serving a different function and each being of equal importance:

1. Initial medical care at Field Ambulance level.
2. Forward surgery at Advanced Surgical Centre and Casualty Clearing Station level.
3. Base Hospital care.
4. Zone of Interior care.

Let us for a moment discuss the surgical implication of each of these units. The initial care in the forward area should be directed towards those emergency measures which will preserve life and facilitate early and comfortable evacuation. These may be conveniently listed in order of priorities under six headings:

1. The arrest of hæmorrhage.
2. The correction of acute anoxia.
3. The relief of pain.
4. The splinting of fractures.
5. The treatment of shock.
6. The preparation for evacuation.

Pressure dressings will control hæmorrhage and have the obvious advantage of preserving the flow of blood in collateral channels; however, a properly applied tourniquet is still preferred for the control of major arterial bleeding in an extremity where evacuation is anticipated, pressure dressings being substituted as soon as a casualty reaches a forward surgical unit and comes under constant static medical supervision before operation.⁵ Venous oozing or minor arterial bleeding must be distinguished from acute major arterial hæmorrhage.

Acute asphyxia in the battle casualty occurs as the result of a penetrating wound of the chest with a tension hæmo-pneumothorax or obstruction to the airway from a wound of the face, oral cavity or neck.

Aspiration of blood and air by a large bore needle which may be left *in situ* is life-saving in the presence of a bronchopleural fistula with severe intrapleural hæmorrhage.

The recognition of the necessity for and the ability to perform a tracheotomy must be part of the requisites of a Field Ambulance medical officer.

Morphine in small doses and by the intravenous route is the analgesic of choice in the field. Beecher^{6, 7} has suggested that barbiturates be substituted where sedation rather than analgesia is indicated.

The importance of adequate immobilization of fractures for transportation cannot be over-emphasized. Recognized methods of temporary splinting by regions are thoroughly described elsewhere.¹⁶

Treatment of shock in the forward area where evacuation is mandatory is a debatable point. Supplies and the time required will be limited at F.A. level. Inadequate resuscitation followed by evacuation frequently results in return of the shocked state. These same patients are later frequently refractory to further resuscitative measures. A mildly or even moderately shocked patient seems to tolerate well the rigours of transportation. It is recommended then that the limited supplies of resuscitative fluids at F.A. level be reserved for the profoundly shocked as a life-saving measure.

Preparation for evacuation must include immobilization of all fractures, and the placing of unconscious patients and those with chest problems in appropriate postures.

The essential functions of the forward surgical units are: (1) resuscitation; (2) arrest of hæmorrhage; (3) prevention of infection.

After participating in two wars, I have never ceased to wonder at the ease with which severely wounded patients are handled in an Advanced Surgical Centre. Within a matter of a few hours, a shell-pocked grain field can be converted into a life-saving major surgical hospital by the addition of a few pieces of canvas and a few truckloads of equipment. In a matter of minutes, 20 casualties all sick unto death can be lying on stretchers in the resuscitation tent with active treatment of their shock being carried out in an orderly fashion by no more than two doctors and a small group of orderlies. It is particularly interesting if one realizes that any three of these casualties would throw the outpatient department of any of our larger city hospitals into complete confusion. The reason why this ordered routine is possible in the field is because adequate, unhurried, organized resuscitation is recognized as a necessary step before surgery and, further, a special ward with all the necessary equipment is set aside for just this purpose. All shocked patients are evaluated and treated in this ward before surgery is anticipated. The diagnosis is made here, dressings are changed, wounds are noted, radiographs are ordered, antibiotics and antisera are given and a graphic chart of the pa-

tient's temperature, pulse, respirations and blood pressure is started. Blood is the resuscitative fluid of choice in the field, supplemented by plasma expanders and electrolytes, the proportion of each being determined by the site of the wound, the degree of tissue destruction and the estimated blood loss. Fluid replacement is relentlessly continued until the blood pressure is above 100 mm. Hg with a pulse pressure of 30 or better and a pulse rate under 100.⁸ Surgery is then never rushed into. It is only when active energetic resuscitative measures fail that the patient is taken to the operating room as a last resort.

Modern thinking is too prone to reflect the premise that replacement of blood volume is synonymous with the treatment of shock. No one will argue with the thesis that the return of an adequate circulation is of prime importance in the relief of shock; however, other patho-physiological changes have occurred as a result of the wound and must be corrected before resuscitation is possible.

The correction of anoxia due to a penetrating chest or head wound, the immobilization of fractures, the relief of pain in an extremity wound, and the initiation of intragastric suction to relieve distension and vomiting in a penetrating abdominal wound, are essential steps in the resuscitation of the severely wounded.

Infection can be prevented by the adequate debridement of all wounds during the "golden period". Debridement implies the removal of dead and contaminated skin, subcutaneous tissue, muscle and bone with a minimum of reparative surgery to structures deep to the skin, with the exception of those organs which require immediate functional restoration for maintenance of life or limb, such as a ruptured small bowel or a severed popliteal artery. Wounds once debrided are left open for delayed primary closure.^{9, 10}

The next level of care is at base hospital, where treatment is again of a different nature. It is directed towards the closure of the previously debrided wounds and the preparation of the seriously wounded for evacuation to "zone of interior". Ideally, closure is undertaken 5-7 days after initial debridement. Wounds are closed by undermining and direct suture, by rotating flaps, by split skin grafts and other recognized methods. Preparation of the seriously wounded for evacuation includes stabilization

of nutritional deficiencies, treatment of infection, immobilization of fractures and other corrective measures to facilitate the long journey home.¹¹

The final stage in this fractional care of the seriously wounded military casualty is given in our D.V.A. and military hospitals in Canada. Here attenuated skin is replaced by full thickness coverage, neurorrhaphies are done, colostomies are closed, tendons are repaired and definitive orthopaedic procedures are done. This may seem a roundabout method of arriving at definitive care, but it has been the experience of military surgeons that this staged surgical treatment cannot be shortened; when attempts are made to accelerate this care, increase in mortality and morbidity is invariably the result.

NUCLEAR WEAPONS

With the above as a background, we might now consider problems of treatment of trauma associated with atomic bomb explosion.

A nuclear weapon will produce casualties from blast, heat and irradiation. It is estimated that 50% of the living casualties will be suffering from burns, 50% from mechanical injuries and 50% from irradiation. Many will have more than one type of injury, hence the total is over 100%.¹²

In etiology, traumatic wounds in a nuclear explosion differ from those resulting from the conventional weapon. Whereas, in a war of artillery, mortars, mines and small arms, the wounds are produced by penetrating or perforating metallic foreign bodies, wounds in an atomic explosion will be the result of secondary effects of blast, i.e. trauma produced by falling buildings, uprooted trees, flying boulders and masonry. Contrary to expectations, atomic bombs have not produced many primary blast casualties, as all injuries within a thousand feet of ground zero will be fatal—the lethal radius being markedly increased in a thermo-nuclear explosion.

Shirabe¹³ found in a survey of 800 survivors from Nagasaki that the majority of injuries were crush injuries, contusions, abrasions, lacerations, sprains, avulsive injuries and simple fractures. I believe then that we can presume that a large number of the traumatic cases will be of a minor nature, and that the majority of the more serious cases will be open and closed

wounds of the extremities, multiple wounds, wounds complicated by burns or irradiation syndrome, blast injuries and, less frequently, open and closed wounds of the head, chest and abdomen.

For the sake of realism and a better understanding of the magnitude of the effects on life and limb, let us assume that a megaton bomb has been dropped on one of our larger Canadian cities, producing some 250,000 living casualties. If 50% are traumatic cases, we will then have well over 100,000 casualties to treat.

The culmination of the efforts of military surgeons in the three wars of the 20th century resulted in a mortality rate of 3%¹⁴ in Korea in those casualties fortunate enough to reach the medical chain of evacuation. Four factors are probably most responsible for this remarkably low figure:

1. Early evacuation with marked reduction in lag periods between wounding and surgery.
2. Abundant equipment, including resuscitative fluids.
3. Adequate surgical potential.
4. Surgeons trained and disciplined to adhere to the principles of military surgery.

In such a disaster as we have visualized with 100,000 traumatic casualties, it is only realistic to assume that lag periods will be markedly prolonged, that equipment will be markedly reduced, that surgical potential will be reduced to a minimum,* and that most of the available surgeons will have little or no knowledge of the principles of military surgery.

If, then, we must deviate from the high standard of surgical care given in World War II and Korea, what alternative plan can we adopt and what will be the results?

It is difficult to visualize the state of confusion which will exist in any functioning medical unit shortly after the blast occurs. Certainly it will not be the ordered routine which prevailed in most instances in conventional warfare.

Our troops were bombed by the Allies in Normandy on two occasions in early August 1944. On each occasion our casualty clearing-station set up outside the city of Caen was overwhelmed. In a short period the casualties overflowed the admission and resuscitation

tents, and soon the meadow adjoining the unit was filled with stretchers. It was absolutely impossible for our small staff to deal with this large group of wounded. Casualties died for lack of care—from exsanguination for lack of a tourniquet, from acute anoxia for lack of a needle in the chest or a tracheotomy and from profound shock for lack of adequate resuscitative fluids. How much greater the problem and more profound the confusion in a sudden atomic explosion! It is my humble plea that we, as Canadian doctors, should be cognizant of the means of dealing with the battle casualty—to be able to delve beyond the grime and dirt of battle, to recognize impending death and know how to treat it.

Our revised thinking must begin as soon as the casualties are brought into the first medical unit. An early accurate diagnosis of the problem with intelligent first-aid measures will alleviate work further along the evacuation chain. In this way, the less serious burns and traumatic cases, which we estimate will be about 1/3 to 1/2 of the injured, can be removed from the already over-committed evacuation chain. They can be sent to units or shelters for the homeless, for they will require no active or, at least, urgent treatment.

However, in spite of rigid selection, overwhelming numbers of gravely ill patients will be pouring into the emergency hospitals. It is only realistic to assume that it will be possible to extend early surgery to only a handful of even the most deserving. As has been pointed out above, the salvaging of ever-increasing numbers of the seriously injured in previous wars has been based on early surgery, abundant resuscitative fluids and time-consuming expert medical care. To direct our meagre resources in a nuclear explosion to the profoundly injured implies the dissipation of valuable equipment and manpower to the care of patients whose chances of survival, under the best conditions, are equivocal. On the other hand, direction of the same amount of surgical potential towards the casualties most likely to survive would seem the only realistic approach.

A NEW PHILOSOPHY

Let us now review the more serious traumatic case in the light of this new philosophy. Which of all the serious wounds are the most deserving

*A discussion of the place of doctors without surgical training, and paramedical groups, in disaster is not within the scope of this paper.

of early operation? What results can we expect by denial of operation and what conservative methods are available to us?

A group of casualties can be anticipated with relatively minor wounds, requiring little of resuscitative fluids but needing immediate life-saving operation, following which survival can more or less be assured. Into this category would fall patients with hæmorrhage from an easily accessible site, rapidly correctable mechanical respiratory defects, and traumatic amputations.¹⁵ It is suggested that operation be extended to this group wherever possible.

It is also suggested that priority for early debridement be given to the extensive lacerations and avulsive wounds along with the frankly compound fracture with a viable limb and limited degree of tissue destruction and shock. A combined burn and mechanical injury poses a difficult problem. Each lesion must be considered on its own merits. For example, I see no reason why a combined full thickness burn of the leg and a simple fracture of femur cannot be treated by debridement of the burn and immobilization of the whole limb in plaster.

Chances of survival of the traumatic case complicated by irradiation are markedly reduced. Priority for treatment must be considered in the light of this phenomenon.

We are now confronted with the problem of what to do with the large group of gravely injured people upon whom we have neither the time, the equipment nor the surgical potential to operate early. In this group will fall multiple wounds, wounds of the central nervous system, severe crushing injuries, severe wounds complicated by burns or irradiation, blast injuries and wounds of the abdomen and chest. If circumstances are so extenuating that early surgery is delayed or denied, everything may still not be lost. Let us now consider some of these cases in terms of expectant treatment.

Unfortunately there will be a group of patients who have been profoundly traumatized, their injuries being so severe and so extensive that all we can hope to do is make them as comfortable as our resources allow. The severe sprain, contusion and abrasion which arrive at the forward hospital need little immediate care. Relief of pain and immobilization will usually suffice. With closed fractures or even the type of compound fracture in which the skin is broken but the bone is not protruding, treat-

ment can be delayed for days or weeks, without any great deleterious effects provided there is adequate antibiotic coverage and proper immobilization of the fractured bone ends.¹⁶

The treatment of closed head injuries is generally conservative. The indications for surgical interference are specific and very limited. Both closed and open head injuries travel well and can be dealt with by neurosurgical teams at a distance provided an adequate airway is maintained during evacuation.¹⁷ Open head injuries decompress themselves and, if surgery is delayed, many of these cases can wait with adequate first-aid including antibiotics and occlusion dressings.

On the whole, the care of blast injuries is conservative.¹⁸ A ruptured eardrum is protected against infection. A blast chest manifest by dyspnoea, chest moisture and hæmoptysis is treated symptomatically by sedation, rest and oxygen administration. Caution must be exerted to avoid precipitating oedema by overzealous venoclysis or injudicious use of anæsthesia. Abdominal blast injuries must be observed in order to detect the occasional case complicated by a ruptured hollow viscus, infarction or persistent hæmorrhage.

Many patients with severe chest wounds might survive, where operation is delayed or denied, with adequate resuscitative measures and antibiotic coverage, repeated aspiration of a hæmo-pneumothorax or the application of an occlusive dressing over a sucking chest wound.

Abdominal wounds are more serious. The excellent results reported on conservative treatment of perforated peptic ulcers by Seeley¹⁹ and others, however, make one wonder whether by continuous gastric or intestinal decompression, re-establishing of acid-base balance and intravenous injection of wide-spectrum antibiotics a certain percentage of cases of perforation of the stomach, small bowel and solid viscera could not be saved, in a dire emergency, by conservative treatment.

If time is of the essence, then there will be time only for life-saving surgery. We must modify our surgical techniques so as to reduce operating time to a minimum. Debridement may have to be limited to adequate drainage; this of course is not ideal, but it will ensure that infection, when it does occur, will be localized to the site of injury. We must ligate even the most major vessels rather than attempt a time-

consuming primary arterial suture or vein graft. We must amputate those extremities whose chance of survival is small, and we must modify our technique in the abdomen and chest to save time.

SUMMARY

In summary, I have tried to present some of the problems we can expect in the treatment of trauma en masse.

The principles of military surgery have been reviewed. It is suggested that, with a basic understanding of the practice of military surgery, we, as Canadian doctors, will be better able to deal with large numbers of casualties under adverse conditions.

The importance of intelligent first-aid, organized resuscitation and fractional surgical care has been emphasized.

Because of overwhelming numbers of injured patients our meagre surgical potential must be used to the best advantage. It is proposed that to do the greatest good for the greatest number, we must ruthlessly exclude all cases with extensive wounds and not waste time on the minor injured. It is suggested that priorities for treatment will fluctuate according to casualty loads, availability of supplies and surgical potential. Priorities for early surgery have been predicated in the light of maximum returns for minimum of effort. Where early surgery is to be delayed or denied, the methods and results of conservative treatment have been postulated.

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THE DEFINITIVE TREATMENT OF BURNS IN MASS CASUALTIES

F. M. WOOLHOUSE, M.D., F.R.C.S.[C.],
Montreal

LARGE NUMBERS of thermal burns have been sustained simultaneously in several instances in recent years, for example, in the Cocoanut Grove fire in Boston and in St. John's, Newfoundland, and Texas City. They were regarded as major disasters and placed incredible strains on civilian hospital facilities. In effect, they were trivial compared with the vast numbers of burns that may be anticipated from an atomic explosion.

Multiple injuries will be sustained in the event of such a disaster but burns will exceed all other forms of trauma. Advance planning is mandatory though varying circumstances such as site of explosion, season of the year, available supplies and function of casualty services make flexibility an important criterion of any plan. It is estimated that each surviving physician will have 100 to 500 burn patients under his care and consequently the treatment must be standardized so far as possible. This standardization is bound to compromise somewhat the ideal treatment of the individual patient.

A great deal has been written on the systemic treatment of the burned patient. This knowledge is widespread and well understood. In general

terms, systemic treatment must include adequate colloid and electrolyte replacement to combat shock, administration of antibiotics in high dosage, early tracheotomy for laryngeal burns, the use of blood to combat late anaemia, and the maintenance of a high calorie, high protein, and high vitamin diet. The definitive care of the burn wound, however, deserves more detailed consideration and here again a plan is required which will have been modified from orthodox burn therapy to accommodate volume.

It is recommended that the initial treatment of the patient be confined to the prevention and treatment of shock. The local care of the major burn wounds may be deferred until the patient reaches a hospital unit. There remnants of clothing are removed and, time permitting, the burn is cleaned with a detergent, loose skin is cut away, and the area sluiced with normal saline or sterile water. Blisters are not deliberately broken. On the other hand, those covered with a thin epidermal shell which will obviously soon rupture are best debrided.

A large percentage of the burns will be of face and hands only. The face should be treated by exposure, the hands by occlusive dressings, and the patient sent home to the care of the family. The universal hand splint is particularly useful as a quick, effective method of dressing burned hands. After cleansing, Vaseline gauze is applied, followed by dry gauze between the fingers and dressing pads. The splint is applied to the hand and the whole is wrapped with bias bandage. This keeps the hand at rest in the position of function. The universal hand splint in its present form is too wide to pass down a coat sleeve. It can be made smaller by trimming three-eighths of an inch (0.95 cm.) from each side at its widest part. The properties of the splint are unchanged, and such a narrowed form could easily be stored in readiness.

It seems certain that there will not be time, personnel, or adequate standard burn dressings to use the closed method of treatment for all burns. The loss of heat in our severe winter climate has been cited as a contraindication to exposure. It is likely that even in a hastily converted building some form of heat could be improvised. Face, trunk and perineal burns are ideal for exposure. These patients should be laid on a surgically clean sheet which is fre-

quently changed. An interposition sheet of thin polyethylene is cheap and disposable, and prevents saturation of the mattress by exudate.

Consideration would be given to the immediate excision and grafting of localized burns in which one is certain of full-thickness skin loss. This procedure is useful for areas other than the hands. With the number of burns anticipated in a disaster, one would not have the organized facilities to utilize this procedure to any great degree.

Where occlusive dressings are employed, they are left intact for 10 days unless fever, odour, pain, saturation or displacement warrants an earlier change. By this time the superficial second-degree burn has healed and the remainder is deep second or third degree (full-thickness skin loss).

After the dressing change, and at the latest by the 14th day after injury, it is imperative to remove the burn eschar surgically. The bed must be prepared to receive the graft before infection can become well established. The latter, together with the negative nitrogen balance, debilitates the patient rapidly and makes the survival of grafts uncertain. Debridement of the burn is carried out under anaesthesia with forceps, scalpel, scissors and the Brown electric dermatome. Wherever there has been sufficient physiological separation of the burn eschar, it can usually be removed by simple trimming with forceps and scissors. There is often a definite line of demarcation between living and dead tissue which makes possible removal of burned skin with very little blood loss. Forceps and scissors alone are used on the hands, and the debridement is very conservative so that no tissue that might survive is removed. On the arms, trunk, and legs large areas of adherent burn eschar can be removed rapidly with the Brown electric dermatome. The blade is set at its wide open position for the operation. Blood loss is considerable and one should have 1500 c.c. in readiness, to be administered during the operation. Attempts to remove the burn eschar from a large area, e.g. back, using forceps and scalpel would be slow and would result in an uneven surface. Removal can be accomplished with the electric dermatome in minutes with less sacrifice of unburned tissue, leaving an even surface.

Regardless of the previous method in use—exposure or closed—all burns are dressed after

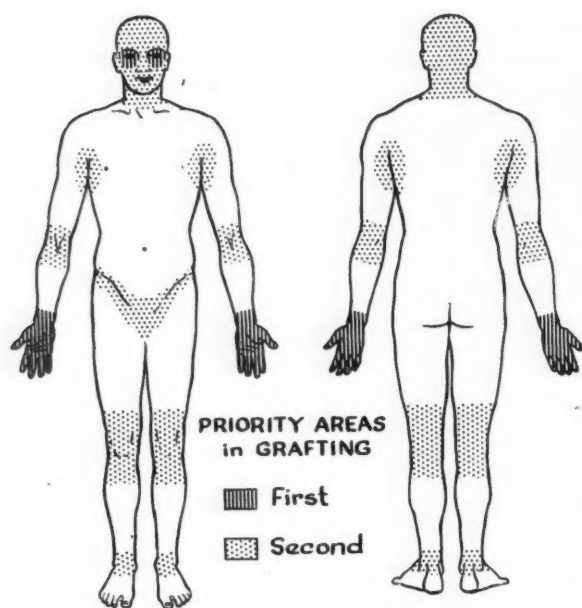


Fig. 1.—Priority areas in grafting.

debridement. Hæmorrhage is arrested by the application of warm sponges, and a dressing of gauze soaked in saline or dilute hypochlorite solution (Dakin's, Hygeol) is applied, followed by pads and flannel bandage. These dressings are left intact for three to four days and then removed. There may be dead tissue present at this dressing so that further debridement is necessary. This will be more common when the surgical excision has been carried out earlier than the 14th day after burning, when the line between living and dead tissue is not so apparent. If necessary, a second debridement is done and the patient's burn is dressed again. Where removal of tissue has been complete, a four-day interval is sufficient time for the formation of a good bed of granulation tissue which is ideal for skin grafting.

The 16th to 18th days after burning should be set as a deadline by which, barring complica-

tions, grafting should be started. There are areas of the body with definite priority as far as skin cover is concerned (Fig. 1). The eyelids and hands are to receive top priority. After these, the flexion creases should be grafted in order to prevent or reduce late burn contracture. The elbow and knee are prone to develop severe contracture and it is important to graft these areas as soon as possible (Fig. 2).

The two most useful instruments to obtain skin are the Padgett dermatome and the Brown electric dermatome. The addition of the electric dermatome to burn therapy has been lifesaving. The machine takes large amounts of very thin skin with ease and rapidity. The only preparation of the donor site is the application of a thin film of lubricant. Skin is taken with a thickness of $8/1000$ of an inch. The electric dermatome has limited use over the abdomen and in very thin people over bony prominences. The Padgett is the instrument of choice on the abdomen and buttocks. The electric dermatome can be used over the thorax when the intercostal depressions are elevated to rib level with subcutaneous saline. The donor sites may be exposed or dressed with flannel bandage impregnated with a mixture of scarlet red dye and castor oil. The dressings are removed in eight days and electric dermatome sites may be used again in 10 days.

Secondarily infected burns may require wet dressings of dilute hypochlorite (Dakin 1:8 or 1:12) four times daily to absorb the exudate and obtain a clean granulating surface. This surface, when ready, requires no further preparation. The skin is laid on in transverse strips which parallel the creases of flexor surfaces. No sutures are used. The skin is trimmed roughly to size but overlapping is permitted. The grafted area is then dressed with a Vaseline gauze such as Jelonet, gauze, pads and flannel bandages.

Homografting is necessary in some patients as a lifesaving measure. The condition of the patient may dictate the use of homografts alone, whereas in other circumstances the combination of autograft and homograft skin would be preferable. In this latter case the grafts are best used as alternating horizontal strips of homograft and the patient's own skin. In this way it is hoped that spreading epithelium from the autograft will largely fill the gap by the time the homograft has been rejected. The source of the homografts may be living donors or



Fig. 2.—Severe elbow contracture which might have been reduced by early priority grafting.



Fig. 3.—Expeditious resurfacing of a burn with minimal secondary procedures. Fig. 4.—A. Inevitable contractures are present. Bilateral ectropion could have been prevented by early priority grafting of lids. B. Postoperative photograph.

cadavers. The grafts are taken with the electric dermatome.

The dressing is not changed on the grafted area until three days after operation. By this time the graft has a vascular and fibrin attachment which is strong enough to hold it in place while an overlying dressing is carefully removed. Any graft which is not adherent at this time probably will not take and is best debrided. Daily dressings of Jelonet and gauze soaked in saline or dilute hypochlorite (Dakin 1:8 or 1:12) are begun.

Patches of granulation tissue protrude between the grafts and in places where the graft

failed to take. Patches larger than 3 cm. in diameter may require subsequent grafting. Those smaller than 3 cm. are usually allowed to epithelialize from the periphery. When the patient has only small granulating areas remaining, 1 cm. or less in diameter, he may be sent home. A daily tub bath is prescribed. The granulations are exposed or dressed with gauze and a topical ointment is applied. A combination of neomycin, polymyxin B, and bacitracin is highly bacteriostatic and convenient to use.

Contractures are inevitable. They may be reduced or in some superficial burns prevented by early grafting and placing grafts parallel to



Fig. 5.—Neck contractures (A) prior to grafting and (B) following excision and application of thick skin graft.

skin flexion creases. When contractures occur, reconstruction may be started four to six months after burning. At the elbow and knee transverse incisions to allow the release of the contracture followed by split skin graft in the defect are useful. The Z-plasty procedure is most effective in axillary contractures. Here one often finds a band of scar tissue in the anterior or posterior fold of the axilla which is thin and taut. It can be readily excised and length obtained with a good-sized Z. Severe scarring of the neck is best treated by complete excision of skin, platysma and any contracted fascia and the application of a thick split graft. Physiotherapy is a useful adjunct in the postoperative period.

Circumstances may necessitate modification of the foregoing plan. It is felt that adherence to the above outline will minimize severe complications, prolonged morbidity and complicated reconstructive procedures. In time of disaster, with medical services already overburdened, any reduction in the above factors will be of immeasurable importance.

We wish to thank Queen Mary Veterans Hospital, Montreal, for Figs. 1, 4, 5 and 6; the Montreal General Hospital for Fig. 2, and Christie Street Hospital, Toronto, for Fig. 3.

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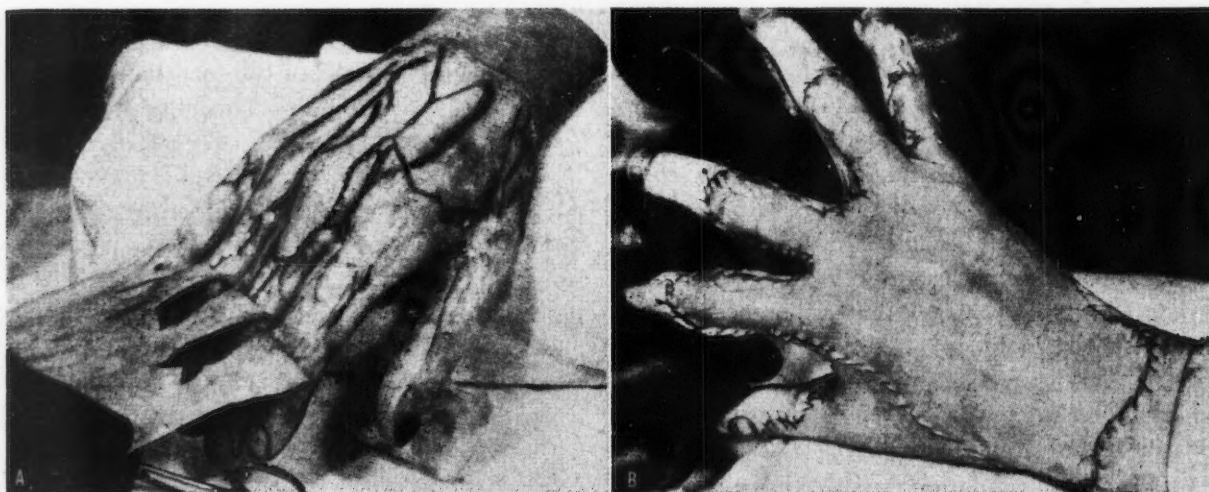


Fig. 6.—A. Method of removal of unstable scar from dorsum of hand. B. Resurfacing with split skin graft interpositioned into bases of fingers to prevent subsequent webbing.

OCULAR DISEASE AND INJURY IN THE EVENT OF A NATIONAL EMERGENCY

CLEMENT McCULLOCH, M.D.,* *Toronto*

IN A NATIONAL EMERGENCY a large proportion of the population may be evacuated from our cities. Certain ocular problems will arise, involving not only those who remain in the cities and face an atomic attack but also people evacuated to avoid injury.

Hospitals in the cities will be asked to remove as large a proportion of their patients as is possible, so that the patients may be transferred to safe areas and that the hospital and its staff may be freed to care for great masses of casualties. All the patients on the eye wards that can be moved without jeopardizing the future of their eyes should go. Complete immobilization is an essential part of the treatment of certain ocular diseases. This applies to: retinal detachments, penetrating ocular injuries, cataract extractions, glaucoma operations, ocular contusions.

Despite the importance of immobilization almost all the patients should be moved; only occasionally might one remain. Even a patient with a retinal detachment might be carried by stretcher, blindfolded. When we consider that if he remains he risks his life and that, in all probability, the ophthalmic staff of the hospital will leave, we can see that only in special instances would it be warranted to leave an eye patient in the hospital.

More important than the selection of patients to be moved is the provision of continuing expert ophthalmic care for them. Most of these patients will need only a few days of hospital care before they may be discharged. If this can be provided at dispersal areas, their evacuation from the hospital in the city will be unlikely to harm them.

A second problem concerns the large masses of people who will arrive in rural areas where ophthalmic facilities may be limited. These people will have as their immediate medical adviser a lay matron or nurse, who can do but a minimum. Considering these circumstances, two possibilities related to ophthalmic disease are worthy of discussion.

Certain infections may appear in epidemic proportion. Ordinary bacterial eye infections, particularly from the staphylococcus, pneumococcus and *H. influenzae*, can spread to an alarming extent. Similarly, cases of viral conjunctivitis, particularly of the APC group, may appear in epidemic proportions. If a large number of cases of conjunctivitis occur in a group of evacuees, it would be wise to consult the nearest ophthalmologist concerning treatment of the infection and limitation of the epidemic.

Certain diseases will require a specialist's attention. An example of such a disease is acute glaucoma. If the non-essential people are removed from a city, a large number of older people will be among them; it is in this group, over 40 years of age, that acute glaucoma will develop. These cases are dramatic in their signs and symptoms and urgently need treatment. An older evacuee who develops blurred vision, pain, possibly with nausea and vomiting, and a red eye, must at once be sent to an ophthalmologist for treatment. Minor injuries and infections will be treated by physicians or medical assistants, without recourse to specialists' advice.

The third problem relates to those who remain in the cities. They may be exposed to an explosion by the atomic bomb. The weapon can vary in its power but the effects can be considered similar. To help gain an idea of what may be expected let us set out the possible injuries which may occur (Table I).

The incidence of ultraviolet burns of the cornea is likely to be small. Ultraviolet light is filtered out rapidly by the atmosphere of the earth. If the patient is close enough to the bomb to get a severe ultraviolet burn, he probably will be so seriously injured by heat, blast, or ionizing radiations that the ultraviolet burn will go unnoticed. If he is far enough away to escape other forms of injury, attenuation by the atmosphere will be sufficient to reduce the ultraviolet radiation to an innocuous level. Those people who do receive significant ultraviolet radiation to their eyes will develop pain and photophobia, coming on 9 to 12 hours after the blast and lasting for approximately 24 hours. The eyes will recover without permanent damage. During the period of pain and photophobia the symptoms can be relieved by topical anaesthesia (Tetracaine ointment).

*Department of Ophthalmology, University of Toronto.

TABLE I.

<i>Time from explosion</i>	<i>Noxious agent</i>	<i>Injury</i>
(a) Instantaneous.....	1. Ultraviolet light. 2. Visible light. 3. Visible light plus infra-red rays.	Burn of the cornea. Glare effect. 1. Retinal burns. 2. Spasm of the iris. 3. Burns of the lids. 4. Corneal burns.
(b) Short pause.....	Blast wave.	1. Contusion effects. 2. Flying particles. (i) Lacerations of the globe and ocular adnexa. (ii) Intraocular foreign bodies.
(c) Continuing radiations...	1. Gamma rays. 2. Neutrons.	1. Keratitis, 2 - 3 weeks latent period. 2. Complications of radiation sickness. 3. Late cataract.
(d) Fallout.....		Complications of radiation sickness.

The glare effect from the bomb is blinding for several minutes. The visual purple of the retina is washed out and reforms slowly. During this period vision is lost. There is no effective treatment but there will not be permanent damage to the eyes.

The high intensity of light and infra-red rays which may fall on the eye can injure the iris. The pigment epithelium on the posterior surface of the iris absorbs these rays, converting their energy to heat. The result is a burn in the depth of the iris. There is likely to be spasm of the iris, with photophobia and pain, lasting two or three days. If spasm of the iris and ciliary body is marked it can be treated with a mydriatic, locally.

Persons viewing the bomb may be burned at the retina. The refracting system of the eye focuses an image of the fire-ball on the retina. This image is so bright that enough heat will be formed to produce a burn. The development of the fire-ball is so sudden that it is impossible to blink before a burn may have occurred. Tinted glasses which might prevent the effect would be so dark that they would seriously interfere with seeing. At night the burn is more severe because the pupil is dilated, letting more light through to the retina. No emergency or definitive treatment is of any help. Persons who suffer a retinal burn will also be temporarily blinded by the glare effect from the bomb. When the glare effect subsides, permanent loss of vision will remain, suggesting a retinal burn.

Burns of the lid may occur. These should be treated like other burns of the skin. It should be remembered that the lids are liable to extreme oedema. One or two days after the burn the lids may be so swollen that the eyes cannot be opened; temporarily the patient may be blind. If at the moment of explosion the lids are closed,

protecting the eyes, there will be no ocular burn. Late contracture of scars may cause deformation of the lids and exposure of the eyeball—requiring extensive plastic repair.

Corneal burns, unless extremely severe, are of a peculiar type. The infra-red rays from the bomb are of high intensity but of short duration. They do not penetrate deeply into the cornea. The precorneal tear film evaporates rapidly and has a cooling effect at the surface. The result is that the burn occurs along a thin plane just deep to the epithelium. Corneal burns cause severe initial pain and photophobia, and later diffuse scarring with considerable loss of vision. They should be treated by patching the eyes and the use of mydriatic.

Contusion effects on the eyeball usually are minor but can be of prime importance. Two important injuries occur. Firstly, there may be displacement or rupture of tissues in the eyeball, causing serious damage. Secondly, there may be an intraocular hæmorrhage. Secondary complications from either of these injuries, such as cataract, retinal detachment or glaucoma, may follow. The first-aid treatment for severe contusion consists of covering the injured eye with a pad and sending the patient for ophthalmic care. The initial medical treatment is rest, covering of both eyes, keeping the patient in bed, and moving him on a stretcher. Definitive care includes treatment of any complications.

Flying particles lifted up by the blast of the bomb may cause injury to the eyeball or to the ocular adnexa. If there are injuries to the eyeball, the important point to decide is whether the eyeball is perforated. An eyeball which has been perforated may contain a foreign body; the eyeball may be filled with blood; important structures such as the lens, iris or retina may be damaged. The eyeball may be leaking and be

TABLE II.

Type of injury	Description	Treatment
(a) 1. <i>Ultraviolet burn</i>	Onset after 6 - 9 hours.	Treat by instillation of tetracaine.
2. Glare effect from light	An initial blindness.	Will clear without treatment.
3. <i>Spasm of the iris</i>	Photophobia, dimness of vision for 1-2 days.	Mydriatic helpful.
4. Retinal burns.....		No treatment.
5. <i>Corneal burns</i>	Pain, photophobia, loss of vision.	Clean the cornea, cover with an eye pad, use a mydriatic.
6. <i>Lid burns</i>	Edema will close the eyes.	Treat as part of the general burns.
(b) 1. <i>Contusion</i>	Can cause pain, loss of vision, depending on the severity of the effect.	Rest, bandage both eyes. Treat the complications.
2. <i>Flying particles</i> .		
i. <i>Penetrating lacerations</i>	Signs may be pain, dimness of vision. The site of perforation, uveal prolapse, intra-ocular hæmorrhage, soft eyeball may be apparent.	Remove the foreign body, sew up the eyeball, treat for local infection and for tetanus. Deal with local complications, watch for sympathetic ophthalmia.
ii. <i>Non-penetrating lacerations</i>	The important decision to make is that no penetration is present.	Remove foreign bodies. It is often unnecessary to suture either the eyeball or conjunctiva.
iii. <i>Lacerations of lids and ocular adnexa</i> .	Important locations are the lid margins and canaliculi.	Plastic repair to give a functional result is necessary.
(c) <i>Ionizing Radiation</i> .		
1. <i>Keratitis</i>	Two to three weeks latent period.	No treatment.
2. <i>Retinopathy accompanying radiation sickness</i>	Loss of vision.	No local treatment.
3. <i>Cataract</i>	Onset after 6 - 12 months.	No treatment.
(d) <i>Fallout</i>	No local injuries described.	

soft or the drainage channels may be blocked and glaucoma ensue. Infection can occur and sympathetic ophthalmia develop. If the eyeball is perforated, any intraocular foreign body should be removed, the cornea or sclera sutured, intraocular infection combated and treatment for tetanus instituted. Any complication resulting from the perforation, such as cataract, intraocular hæmorrhage or glaucoma, must be treated. A watch must be kept for signs indicating the development of sympathetic ophthalmia. Perforating and intraocular injuries are serious injuries. The first-aid man should watch for these; when he finds one, he should cover the eye with a pad and send the patient for ophthalmic care.

Lacerations of the ocular adnexa, particularly the lids, may be extremely debilitating. The lids should be sewn, taking care to obtain a functional re-establishment of the tissues. This requires surgical care and a familiarity with the structures of the orbit and their function. It can be best performed at an ophthalmic unit.

The ionizing rays which affect the eye are gamma rays and neutrons. Beta rays are rapidly attenuated by the atmosphere and therefore are unlikely to cause serious ocular damage. Gamma rays and neutrons pass out instantaneously with the explosion and continue to be emitted for a number of seconds. The early specific

ocular injury is a keratitis, coming on after a two-week latent period. There may be the late development of cataract, six to 12 months after the blast. The secondary ocular injury occurs at the retina, which may show hæmorrhages and exudates, 10-14 days after the blast, complicating radiation sickness. There is no emergency treatment for any of these conditions. Fallout of radioactive material from the bomb has not been known to cause any specific ocular complications.

The various injuries and the treatment which might be undertaken are listed in Table II. Those injuries that need active treatment are in italics. Some of these are minor; the eye will clear without complications. Others have an extremely guarded prognosis. It is essential that the important ocular injuries be recognized and sent on for adequate ophthalmic care.

In the light of the injuries which may be produced, the problem of treating mass ocular casualties has three parts:

(a) The physical necessity of seeing a large group of people and deciding in which case serious injury is present.

(b) The transporting of those with serious ophthalmic injury to locations for definitive care.

(c) The provision of facilities which will be adequate in amount and capable of giving definitive care.

This problem must be solved at three levels: when the patient is first seen near the site of the bomb blast, when the patient is seen by the general physician at some clearing station, and finally when the patient is seen by an ophthalmologist at an ophthalmic unit.

The first-aid man at the site of the blast must decide which case he can treat, with reassurance, minor medication or with a bandage, and which must go on to more expert care. The possible dangerous injuries are corneal burns, lid burns, contusions, laceration of the eyeball with or without intraocular foreign body and deforming lacerations of the lids or orbit. The other effects from a bomb may be prominent, but they are not likely to cause permanent damage to the eye. Important signs and symptoms are:

(a) The patient's description of what happened at the time of the blast. Was he exposed to flying particles, such as glass; was he facing the blast? This may give the first-aid man a hint as to what type of injury the patient received.

(b) Pain and photophobia suggest a severe ocular injury, although lack of these symptoms cannot be taken as having significance.

(c) Great loss of vision should indicate to the first-aid man that the patient must be sent on for further care. If the vision is good, the patient still may have a serious injury.

(d) Examination of the eye is of prime importance; foreign bodies, lacerations, intraocular hæmorrhage or a soft eyeball may be present, all of which indicate a serious injury. A small conjunctival laceration should be regarded with suspicion, for it may hide an ocular perforation. Any deformation of the eyeball, or inside the eyeball, points to serious damage. A flat anterior chamber, a deformed or eccentric pupil, and a non-reacting pupil indicate that the patient should be sent on for ophthalmic care.

The physician must decide which patients he can adequately treat or have treated at his unit, and which must be sent to an ophthalmologist. He would be wise to keep in mind the scene about him. Rather than tie himself up attending a few patients he should move about, surveying patients and directing some to ophthalmic units. He could arrange that certain groups in his unit undertake certain forms of treatment, such as having a competent aide lifting out minor foreign bodies. He should limit his unit's efforts towards treatment to removing debris, removing

superficial foreign bodies, washing away chemicals and treating mild burns of the lids or eyeball.

The general physician's greatest ocular responsibility will be in deciding whether or not a patient is sent on to an ophthalmologist. He should pay attention to burns, contusions, lacerations, intraocular foreign bodies and deforming injuries to the orbit and lids. Burns tend to grow worse with time. What originally appeared to be a minor burn may eventually be serious. Swelling of the lids tends to increase, burns of the eyeball become more apparent and late scarring causes eventual loss of vision. If a contusion is present, the bad signs are poor vision, displaced structures and blood in the eye. The important point concerning an ocular wound is to decide if it is penetrating or non-penetrating. The penetration may be through the anterior or through the posterior segment of the eye. If it is through the anterior segment, there may either be no displacement of tissue, or the anterior chamber may be collapsed, the iris may be out of place, blood may be present, the eyeball may be soft. If the penetration is through the posterior segment of the eye, there may be a hardly noticeable conjunctival cut and no other obvious sign. If an ocular wound is leaking, the eyeball will be soft; if the wound is not leaking, the eyeball will be firm. Cases with penetrating lacerations of the eyeball should be transported by stretcher, particularly if the eyeball is soft.

Foreign bodies enter the eyeball through either the anterior or the posterior segment. The anterior chamber need not be deformed, the posterior segment may be relatively unharmed, an intraocular hæmorrhage is not necessarily present and the point of entry may be hard to see. Despite this paucity of signs the eyeball is seriously threatened and expert treatment is necessary. Therefore, cases of intraocular foreign bodies form an important group for which the doctor must be on guard.

Lacerations with resultant deformities of the lids can be extremely debilitating. These should be sent on to an ophthalmic centre for repair, as it will be necessary to obtain functional re-establishment of the structures.

At his unit the ophthalmologist must keep in mind the whole scene. He should allot his time so as to do the greatest good to the greatest number of people. If he is rushed, he would

be wise to treat only those liable to gain from his help, not spend too long on any one man, and pause occasionally to supervise the routing and discharge of patients.

Injuries from the atomic bomb are of several types. The first-aid man and the general phy-

sician must be prepared to sort the seriously injured out from the great mass of patients. The ophthalmologist must be prepared to spread his effort to do the most good to the largest number of people.

PSYCHOLOGICAL AND SOCIAL ASPECTS OF CIVILIAN DISASTER*

J. S. TYHURST, M.D.,† *Montreal, Que.*

THIS PAPER is concerned with the individual and social psychological aspects of emergency situations. It is directed to physicians in general in the belief that they, not psychiatrists, play the central role in the early management of psychological distress in disaster, and therefore in the prevention and early treatment of psychiatric disability.

The literature on this aspect of emergency situations has until fairly recently been based either upon experience in war^{12, 19} or upon the reporting of unplanned involvement in some natural catastrophe. In the last several years, there has been a rapid increase in planned research and systematic review and investigation.^{7, 17, 18, 20, 22, 27, 29-31} These findings have in turn been applied to the problems of medical planning in civil defence and civilian disaster.^{1, 9, 10, 14, 32, 33} The material in this paper is based upon this literature and also, more particularly, upon field studies carried out by the author over several years in Canada.

The plan of the paper is to describe in outline the natural history of individual and social reactions to disaster in the belief that knowledge of these basic patterns of response is essential for understanding and rational action before and during any disaster.

It is so often implied that because disaster situations seem to present many unique circumstances there is little point in trying to plan for management in advance. Many of the experiences in disaster are so charged with intense

and subjective personal feeling that the main impression one gets is of this uniqueness and unpredictability. However, the task has been to search for the general and characteristic patterns of psychological response to disaster, to describe them, and from these descriptions to draw such concrete recommendations as will provide a basis for action from one emergency to the next.

INDIVIDUAL REACTIONS

Turning first to individual reactions in disaster, it is possible to describe a consistent pattern which consists of three overlapping phases: (a) a *period of impact*, (b) a *period of recoil*, and (c) a *post-traumatic period*. Each of the three periods may be characterized according to stress, time duration, and psychological and social phenomena. This conception has been described elsewhere but the main features should be recapitulated here.²⁹

Stress. (a) The first period of impact is characterized by the presence and effect of initial stresses and continues until these stresses are no longer operating upon the individual or group. It is the period of maximal and direct effect of the disaster. (b) The period of recoil is characterized by a suspension of initial stresses, and thus begins when the individual has succeeded in avoiding their direct effect for the moment at least, by one manœuvre or another, such as escape. Some stresses may continue (e.g., cold or injuries incurred during the first period) but from a psychological point of view, and relatively in terms of intensity and type, the stresses are suspended during this period.*

*Further stresses may be of such a type and severity as to impose a prolongation of the first period of impact; or, put in another way, as to produce a second impact immediately following the first, and thereby postponing the period of recoil for varying periods of time. In this discussion, however, the progression following an acute stress is described, and the progression in the event of prolonged or repeated stresses will be developed from this.

*From the Department of Psychiatry, McGill University, Montreal. The field studies upon which this paper is based were supported by grants from the Defence Research Board, Ottawa.

†Associate Professor, Department of Psychiatry, McGill University, Montreal.

(c) The stresses of the post-traumatic period are derivatives of those of the initial period of impact and are more obviously "social" in nature. This is the period during which first full awareness is possible of what the disaster has "meant" in terms of loss of home, belongings, financial security, and particularly of bereavements. It begins after the security from initial stress has been first fully established, and when the individual comes to face once again the matter of daily living but in an environment altered in one or several crucial aspects (bereavements, loss of home, office or possessions).

Time.—With regard to *duration*, (a) the period of impact may vary within fairly wide margins. However, for the acute catastrophe it may last for from only three to five minutes to one hour. The period of impact in the case of a marine fire was about three to six minutes; in the case of flood, about $\frac{1}{2}$ to $1\frac{1}{2}$ hours. (b) The duration of the period of recoil also varies, but to a smaller extent apart from abnormal reactions, being determined more by individual differences than by the nature of the stresses, lasting from several hours to a day or two. (c) The post-traumatic period lasts, hypothetically at least, for the remainder of the person's life, and includes the period of rehabilitation.

Psychological phenomena.—The following is a summary of the main trends observed. (a) During the period of impact, reactions separate into three main groups. One group of about 12-25% of survivors are what might be described as "cool and collected" during the acute situation. They are able to retain their awareness, make an "appreciation" of the situation, formulate some plan of action, and carry it through. A second group, representing what might be called the "normal" reaction to the period of impact and making up about three-quarters of the survivors, are stunned and bewildered. Most of the readers of this paper would probably fall into this group. They show certain characteristics during this period that are of great importance for understanding their behaviour: a definite *restriction of the field of attention*; *lack of awareness* of any subjective feeling or emotion although manifesting the physiological concomitants of fear, and automatic or *reflex behaviour*. The last group, of about 10-25%, show manifestly inappropriate responses—states of confusion, paralyzing anxiety, inability to move out

of bed, "hysterical" crying or screaming, and so on.*

(b) *During the period of recoil*, the majority of survivors are seeking shelter, sitting in or pacing about hotel lobbies, moving into the homes of friends or relatives, driving in taxicabs or ambulances, obtaining temporary shelter or care, or giving an account of their experiences for the first time. During this period there is a gradual return of self-consciousness and awareness of the immediate past. Subsequent recall is more complete for this period, but still not absolutely so. It is the period during which, for the majority, the first overt emotional expression occurs, and during which they first experience a subjective awareness of feeling or emotion—*anxiety, fear, anger*. During the period of recoil, the majority of survivors achieve their first awareness of what they have just passed through—and the disaster first achieves this limited perspective. There is a need to talk or "ventilate" during this period, to get angry at someone or to express oneself in some way. The need to ventilate is associated with a childlike attitude of dependency, which is an essential ingredient of this phase. Dependency may be precipitated in previously uncommunicative and unresponsive survivors by any genuine act of reassurance or aid on the part of people dealing with them. They want to be given something—coffee or a blanket—or to be looked after, and the importance of the giving and nursing appears not so much related to the actual kind of aid, as to the psychological meaning of being cared for. When one talks to survivors some time afterward, they describe those attitudes with some amusement, at the same time stressing the real and compulsive character of their needs during the earlier phase. In most, the period of dependency is transitory and even a day or two later the survivor may be quite unwilling to talk as freely as he had earlier. His manner is again fairly independent and he may be quite unwilling to accept help even though he needs it badly.

This is only a brief outline, but the present impression is that *the period of recoil* represents

*The psychological phenomena of this period of impact as described have an important bearing upon other developments, both during this period and subsequently. These include the evolution of hostility and its attendant scapegoating, the dynamics of initiative and leadership, the dynamics of guilt as may develop subsequently, and the function of group dynamics with respect to the individual. Because of limitations of space, these considerations have been omitted from this outline.

a most important part of this pattern of response to disaster. Both the character of individual responses during this period and their management by personnel engaged in rescue and relief would appear to have a crucial significance for subsequent psychological events.

(c) Most people have shown that the reactions of *the post-traumatic period* are more or less closer to those phenomena with which psychiatrists are familiar and which are described in the literature as post-traumatic reactions. They include temporary anxiety and fatigue states, psychotic episodes, recurrent catastrophic dreaming, depressive reactions, and so on. The more severe and prolonged reactions that are included in the general terms "traumatic syndrome" or "post-traumatic neuroses" become apparent during this period.

EMOTIONAL REACTIONS AND PSYCHIATRIC CASUALTIES

From this brief description, it can be seen that most people will show signs of psychological and emotional disturbance immediately following a disaster. The majority of such reactions will be transitory, recovering spontaneously or responding quickly to rest and sympathetic management, and they should be considered normal. There will be a number of more severe and persistent reactions—the psychiatric casualties—but it is not expected that these will increase very greatly as long as they are treated right away and close to the scene. The appearance of psychological disturbance in some way may be delayed, masked or obscured by physical injury. Many physical complaints—nausea, dyspepsia, gastric upset, headaches, and so on—will be the outcome of emotional disturbances rather than physical disease, and may become persistent if not recognized and treated appropriately.

SOCIAL CONSEQUENCES

Turning next to the social consequences of disaster, it is useful to refer to two periods—the first during and immediately after the catastrophe itself, and the second, coming also at and shortly after the disaster, but continuing during the period of recovery.

The immediate effect of any catastrophe, during the period of impact, is upon the patterns of social interaction upon which all of us depend.

These patterns range from intimate and subtle relationships through to institutionalized and more formal patterns of expectation and response which are increasingly important as the size of the community increases. Members of families and close friends are separated, and at the same time the function of various social institutions and social roles—utilities, medicine, communication, police, transportation, welfare—may be impaired or destroyed. The social "fragmentation" is immediate and extensive. Numbers of individuals are suddenly, and possibly without warning, transported from the familiar to the unfamiliar, are threatened and disoriented.

Besides general bewilderment and confusion, the possible consequences initially are mass reactions such as "panic" or mass exodus, or general, agitated, random and purposeless hyperactivity.

Wholesale "panic" of the more lurid variety has not been a common finding at the level of cities and larger communities in disasters, particularly where some prior planning exists. Evidence from Halifax,²⁴ Hamburg,³¹ Hiroshima, and Nagasaki³² indicates that although some immediate and large-scale exodus may develop, more typical is momentary escape, return and purposeless activity.

These considerations apply to the situation at the time of and just after the disaster. Further developments immediately following these are of equal importance and may be characterized as follows:

1. *Social paralysis.*—In the area affected, the catastrophe will have had two principal effects: the destruction of physical facilities upon which social organizations and social cohesion depend, and the disorientation of the persons whose social roles give the society life. Despite previous planning, for the area itself and unless social organizations are introduced from outside, the result would be a period of more or less social paralysis which is likely to last for at least two days. Individuals and small groups may be operating effectively at isolated points, but as a whole the community will be prostrate. The majority of people will show various kinds and degrees of normal and transitory but debilitating emotional reactions. They will be concerned mainly with their families and their possessions. Thus, although there may be some rudimentary social activity, the social organization will be severely crippled and its immediate

recovery will depend upon the introduction of social organizations from without.

2. *Spontaneous group formation.*—Catastrophe leads to the development of strong feelings of dependency, as already described. People exhibit a strong need to be with others, a disinclination to be left alone, and there is the momentary disappearance of the usual social barriers. Although group formation is an important feature in disaster, group characteristics are quite different during the various periods. During the period of recoil, the group behaviour is based upon the needs of the survivors to seek out people, and yet at the same time is characterized by the instability of the groups so formed. There is a definite desire and need to be with others, and to achieve a stable, supporting interpersonal environment. The initiative for this, however, must come from persons other than the survivors, who, though needing others, need them purely for themselves. The result of this is the spontaneous formation of groups which have a definite adaptive value, satisfying strong temporary needs for reassurance, dependence, and talking out. These groups, however, are not particularly effective in getting things done, or in restoring social organization. The groups are typically shifting and unstable and are based upon a community of strong feeling, rather than upon any common rational recognition of the need for co-operative effort, or upon a program of action and recovery.

3. *Group disintegrative attitudes.*—Accompanying the spontaneous appearance of groups, there are a number of attitudes and emotional states which contribute to the instability of the groups, and also make it difficult for leaders or persons from outside to develop effective action. These attitudes and states include irritability, free-floating and indiscriminate hostility, self-concern, anxiety and tension, and the pressure to talk about, to reconstruct, and to assimilate the experience just past. These attitudes must be kept in mind when one is trying to deal with people during this time. They can offer a serious problem for relief organizations working in the stricken area.

4. *Rumour formation.*—Particularly if the disaster has occurred without warning, there is an immediate spate of rumours. These concern every aspect of the event—what happened, how, why, when, to whom. Although such rumours are clearly the result of attempts to secure re-

liable information, they also may be expected as the outcome of needs to express hostility. This hostility seems to be quite common in catastrophe, for most people feel, obscurely, that someone must be at fault—"Why should this happen to me?" Many people in a disaster become not so much fearful as angry. If this anger cannot be canalized, as for example against the enemy, which is obviously the most successful resolution, it may be directed against groups and individuals within the society—minority groups, civic officials, or the government. Rumour also develops because some people attempt to justify their own behaviour, to give the event concrete dimensions, and to reduce it to something that can be understood and assimilated psychologically. The danger is that rumours distort reality and lead to fantastic thinking and baseless fears, sufficiently severe to produce further eruptions of impulsive individual or mass behaviour. Although it is unnecessary and can probably be prevented, with adequate planning and understanding, radio and the newspapers have too frequently assisted in the elaboration and embedding of rumours at this time.

5. *Emergent leaders.*—The civic leaders of normal times may be replaced by leaders who emerge during and following a catastrophe. Such individuals may play an important and vital role in recovery and usually disappear again when things have returned to normal. Their appearance is based not solely upon their personal characteristics, but also upon their background and qualifications in relation to the particular needs of the situation. In a large mid-western city during a serious flood, there were at least five or six emergent leaders, who were crucially important in the management of the disaster situation, but who subsequently disappeared almost completely and have had no particular civic responsibility since. One of them literally took over behind the scenes, directing the activities in the central part of the city, and in fact administratively displaced the mayor. In all the municipalities that made up this metropolis, there was only one mayor acting in that capacity immediately following the bursting of the dykes. These emergent leaders can be of greatest importance to the community. They provide energetic and decisive leadership at a time when it is most needed, can galvanize their communities into constructive activity or can

provide an effective liaison between organizations coming in from outside and the local population.

* * *

With this brief description of some of the individual and social consequences of disaster in mind, I would like now to outline some of the factors that seem important in determining the nature and severity of the reactions and the process of recovery. It is clear that the severity and persistence of adverse social circumstances will have a direct bearing upon the severity and persistence of individual psychological disorders.

1. *The element of surprise.*—The amount of planning and the period of warning are important, but previous information and anticipation are not always necessarily favourable. Their effect depends upon how the information and warning are given. While it seems clear that warning should allow people to take measures to protect themselves, it is just as clear that warning followed by anticipation may also key people to an intolerable pitch of anxiety and tension. The period of anticipation, if at all prolonged, should therefore be taken up with concrete activity which allows some draining off of tension and eliminates a period of inactive waiting. Among the factors conducive to the development of impulsive behaviour are gradually mounting feelings of helplessness accompanied by anxiety. Previous information and planning can also be unfavourable if delivered at intervals in a startling or alarmist fashion, or if they deal in generalities without concrete references to what should be done. In many instances the periodic publication of dire warning punctuated by long periods of complete official silence can lead to denial. The public, after a number of exposures to this type of information program, simply refuses to react any more, and becomes described as "apathetic"—as towards civil defence. Again, an information program, if not concrete, matter-of-fact and action-oriented, may serve to "sensitize" the public rather than inform it. This may lead gradually to a chronic and explosive state of anxious anticipation which is simply triggered by the disaster. Under such circumstances, a reaction of denial may be the healthier alternative. It thus seems important that an information program and planning be pitched at a fairly dry, matter-of-fact level, that it be con-

tinuous, and that it be concerned with concrete things to do. If warning is possible, in view of what we know, this period of waiting and anticipation should be taken up with action that is clearly planned in advance and to which the public will turn in a reflex fashion.

2. *Separation of family members.*—For family members to be separated during the acute period of a disaster appears to be particularly unfavourable socially and psychologically, particularly for children. On these grounds, there is a strong argument against the separate evacuation of family members, unless one is dealing with a trained and disciplined body such as the military for whom separation is expected, or unless those leaving go to secure billets planned in advance, and those staying behind have a definite job to do.

3. *Outside help.*—During the period of social disorganization and paralysis following disaster, it has frequently been observed that among the first to initiate recovery are single persons, and visitors to the city. Small informal groups may appear locally, but their efforts at first are usually scattered and ineffective. Instead, it appears that if the community is to recover reasonably quickly, aid must be provided from areas and towns on the periphery of the affected area. This obviously requires previous planning at the periphery, whether it is to send help into the affected area, or to receive evacuees, casualties and survivors. It can therefore be taken for granted that planning for this particular role in disaster is as necessary and important for the majority of suburban and rural areas between or near target areas as it is for the target areas themselves. Furthermore, the role of military and quasi-military organizations must be considered in this connection. The regular army or militia possesses the organization, the discipline and the equipment (such as communications and transport) vitally necessary for dealing with disaster. In practice, therefore, it is very probable that the armed forces are going to play a considerable and important part. Their activities should however be limited to the acute or early period and the later phases of the disaster left to civilian management. To be most effective, the armed forces should receive fairly intensive instruction, at least at the staff level, in dealing with civilians during disaster. The relationship of the military to the civil society during disaster is a topic worthy of much more

detailed discussion than space and time permit here.

4. *Leadership*.—The importance of leadership in crisis is well recognized. The management of the period of impact and of the individual social disorganization following the disaster provides an acute need for leadership. There is still a great deal we have to learn about this important factor, for despite the long-standing recognition of its importance, we are still unable to pick leaders or train them with complete confidence that they will be able to perform most effectively when the time comes. There are, however, a number of points concerning leadership in disaster that might be noted:

(i) It appears that the *kinds of leaders* required during succeeding phases of the disaster are different. For example, whereas leadership following a disaster may require the ability to be decisive, authoritative and directive, and to provide an example with which identification can occur, in later periods leadership must be characterized by qualities that include the ability to work with others, minimize differences wherever possible, to organize and to persevere. It may be suggested, too, that the leadership required to promote interest and planning before disaster has different qualities again. I have already mentioned the emergence of leaders following a disaster, and it is of importance to recognize that these changing requirements of leadership should be met by flexible planning and sufficient social understanding before the event so that previous planning and organization for leadership is not so rigid that it cannot be discarded as necessary.

(ii) There are different *levels of leadership*. This is well recognized by the military, but there is great danger in carrying this analogy too far and in applying military patterns of leadership to civil society. One cannot place leadership in civil society from outside or from above downward and expect it to work, save during the most acute period of a crisis when public dependency is maximal. Instead, it is necessary to find out what leaders there are at various levels of society as it exists, to encourage them and to work with them. Failure to do this can be one of the more serious blunders of central planning for disaster or of quasi-military organizations moving into a disaster area from the outside.

(iii) A number of *social roles* in society have, in normal times, "built-in" potentials for leadership at time of disaster. This is obvious in the case of any uniformed groups such as the military or the police. It is particularly true, also, for the doctor. It is to the physician that people turn in times of stress, for reassurance, guidance and advice. A physician's role has therefore many powerful elements of leadership and it is the doctor's responsibility to recognize these elements in his own role and to be ready to carry out this function.

5. *Communications*.—Now that the more organic, informal and personal forms of communication typical of the small community have given way in the large city to more impersonal devices such as radio and television, the maintenance of these technical facilities becomes essential. Previous to disaster, for example, it is not enough to communicate a warning. Once this has been given, communication must con-

tinue—a strong need for information and guidance will have been immediately established. Afterwards, the guidance, reassurance and social cohesion provided by good communication can prevent the disorientation and confusion that leads to impulsive, irrational behaviour on the part of individuals and groups.

Rumour formation is one direct consequence of false or inadequate communication; providing factual information rapidly, directly and to the right place is essential. Whether in evacuation areas at the periphery, or in delivering help to affected areas, the establishment of a communications network and of public information centres known and available to all should be a task of first priority. These centres, furthermore, should not be concerned with delivering a message or some propaganda worked out in advance and intended to be generally reassuring, but should focus upon meeting the needs for information developing at the time and in the particular place.

Radio and television are not the only means of communication. In times of stress, institutional symbols take on added meaning. One should recognize the communication value of the first-aid sign, the badge, the armband, the uniform, and the red cross. Such symbols have very strong connotations, and should not be used indiscriminately but strategically to ensure their maximum effect for information and reassurance.

6. *Measures directed towards reorientation*.—The re-establishment of the familiar, the re-identification of people as individuals and as social roles, and the early recognition of basic social groupings (e.g., the family, the work group) are essential features for the process of recovery. They can be promoted by the factor of *communication* already referred to. Besides this, evacuation and temporary shelter should be provided in such a manner that *family life and routine but meaningful activity* can be restored as soon as possible.

One of the most significant factors—to my mind, the most significant—is *the registration of evacuees or survivors*. This means taking their names, their addresses, the names of their relatives or friends, their occupations and such information as they have about neighbours or friends. What this does is to *identify* people once again. Its importance is not simply that people such as administrators or officials know

where the individual is, but that the individual knows that others know *who he is, where he is and how he is*. He is a member of society once again. The information gathered in this manner should be collected in a central clearing-house and made readily available so that anxious relatives can get in touch with one another, and people know that others will be able to find them.

The following brief passage from a Japanese physician's account of his experiences at Hiroshima may serve as illustration.

"[At the hospital] The corridors were cleared enough to be passable, but in a little while they were as crowded as before. One difficulty was the influx of people looking for friends and relatives.

"Parents, half crazy with grief, searched for their children. Husbands looked for their wives, and children for their parents. One poor woman, insane with anxiety, walked aimlessly here and there through the hospital calling her child's name. It was dreadfully upsetting to patients, but no one had the heart to stop her. Another woman stood at the entrance, shouting mournfully for someone she thought was inside. She, too, upset us.

"Not a few came in from the country to look for friends and relatives. They would wander among the patients and peer rudely into every face, until finally their behaviour became so intolerable that we had to refuse them entrance to the hospital. . . ."¹⁵

7. *Evacuation of populations.*—Mass exodus and evacuation have been major features of all community disasters from the hurricane or flood to the atomic bomb. It must be expected in any peacetime or wartime disaster of the future. It occurs spontaneously, without orderly movement or direction, and as a blind but powerful impulse to leave the stricken area as soon as possible. A mass movement of return will eventually develop, accompanied by trekking in and out of the area, but the initial spontaneous mass response is exodus. Despite organized planning in the U.K. in some areas, a very large proportion of evacuation took place on a private basis.²⁷ The following observation comes from Hiroshima.

"... After the *pika* (explosion) the entire population had been reduced to a common level of physical and mental weakness. Those who were able walked silently towards the suburbs and the distant hills, their spirits broken, their initiative gone. When asked whence they had come, they pointed to the city and said, 'that way'; and when asked where they were going, pointed away from the city and said, 'this way'. They were so broken and confused that they moved and behaved like automatons.

"Their reactions had astonished outsiders who reported with amazement the spectacle of long files of people holding stolidly to a narrow, rough path when close by was a smooth, easy road going in the same direction. The outsiders could not grasp the fact that

they were witnessing the exodus of a people who walked in the realm of dreams.

"A spiritless people had forsaken a destroyed city; the way and the means were of no importance. . . . Each to his separate course for no better reason than the presence of another in the lead. . . ."¹⁵

Recently, the increase in the destructiveness of nuclear weapons has led to an increasing emphasis in civil defence upon planned evacuation and dispersal of populations from target areas. There has been a tendency in various quarters to regard such planning as unrealistic and to take a fatalistic attitude in the face of such serious threat. Such attitudes, however, could not be more inappropriate, as we can be absolutely sure that spontaneous evacuation of more or less the whole remaining population will occur. Where this is disorderly and particularly where escape is delayed or blocked, panic is likely. It is most probable that such survival as is possible will depend upon the planning that has gone forward in respect to evacuation, both in the target area and in the peripheral communities.

The types of evacuation envisaged—pre-attack evacuation and planned withdrawal—are currently under study by Civil Defence, and the technical problems presented by the plan—detection, communications, warning, transport—are under consideration. Besides these technical problems, however, it must be recognized that planned evacuation means a major social upheaval with serious psychiatric and social implications both for those being evacuated and for those receiving the evacuees in peripheral communities. A large population movement such as this, carried out in a few hours, transplanting an urban population to rural or suburban life, will mean very rapid social psychological change for all concerned and intensive problems in adjustment.²⁸ When a population is billeted for any period of time, only careful planning and specific attention to social and psychological problems will avoid the development of severe interpersonal and social tensions. Such developments have been observed in Canadian studies and in the U.K. during the last war.

"Public opinion was shocked by the experiences in evacuation in 1939 (in the U.K.). . . ."²⁷ There was fairly careful planning for certain technical problems such as transportation, but too little for the personal. "The indiscriminate handing around of evacuees in the billeting of 1939 inevitably resulted in every conceivable kind of social and psychological misfit."²⁷ There was widespread lack of knowledge concerning the kinds of reactions that

would develop in the evacuees, and little understanding of the standards of conduct, dress or expectation of people from such different backgrounds. In children, for example, the marked increase in enuresis, faecal incontinence and aggressive behaviour which might have been predicted was found by those billeting the children to be incomprehensible and shocking.

The point could be illustrated and documented at much greater length. Briefly, it cannot be stated too often that planning for evacuation by medical officers in peacetime or wartime disaster must include reference not only to physical health but also to psychological and social health and welfare.

TREATMENT FACILITIES

It can be seen from the description of the psychological state of survivors following disaster that most people will show emotional and psychological upset of varying degrees of severity and that most of these states are transitory. Experience has shown that a high proportion of those with even fairly severe disturbances will recover if treated early and close to the scene.¹³ The main needs are for brief rest, an opportunity to talk out the experience, and the resumption of concrete activity. Heavy or repeated sedation should not be used, and should be avoided wherever possible. A greater than usual degree of hyperactivity, talkativeness and restlessness is normal and should be allowed time to subside. The expectations and attitudes of medical personnel at this stage will be crucial for the prevention of persistent disorders. It is not expected that the incidence of psychosis will increase, but the most severely disturbed should be removed for psychiatric treatment as they have a demoralizing effect on others and may respond to more active psychiatric management.

CHILDREN

Before concluding, a brief reference should be made to the reactions of children. It has been consistently observed that separation from the parents, and the behaviour and reactions of the parents, are crucial factors in determining the reactions of children to disaster. The most severe features of war for children in the U.K. psychologically were not the bombing and sights of destruction and injury, but the problems of evacuation, displacement from the familiar, and separation from parents. The children appear to experience the dangers not directly but as

mediated by significant adults upon whom they depend. This important role of parents and family has again been noted in a recent U.S. study.² It has been suggested that there may be age-specific differences in the reactions of children. For example, it has been suggested that older pre-school children (2 to 5 years) suffer more intensely than those under 2 years,⁵ or that children 5 to 7 years are particularly affected. Throughout the prolonged experience in Britain with bombing and evacuation, the increases in enuresis, faecal incontinence and aggressive behaviour were features of importance, and problems of separation and familiarity were the important factors.^{3, 11, 23, 25-27}

SUMMARY AND CONCLUSIONS

"What should the doctor do?"

The previous sections have provided a description of the social and psychological consequences of disaster and of the factors that influence the severity and persistence of unfavourable reactions. As a summary and in conclusion, it may be useful to draw from this general outline some recommendations as to what the doctor should do, stating this in somewhat brief and dogmatic form.

All of the recommendations bear upon the prevention and treatment of serious disorders such as *panic*. *Panic is not an entity*, a sort of disease that can be treated by some single specific treatment or prevented by a single specific immunization. Rather, the word panic refers to a situation—a psychological and social situation—one of the features of which is irrational, fearful and impulsive behaviour. Panic is conditioned by *all* the factors discussed in this paper, and is the endpoint of a process of psychological and social decompensation under stress. Characteristic of this process and of approaching decompensation is the existence of rapidly mounting feelings of fear and anxiety in a situation where the individual or group feels helpless and trapped. Part of the same process are earlier signs and symptoms such as marked or irrational fears, rumour formation, hostility, failing communication and minor impulsive and irrational acts of which all of us are capable. The task is to learn to prevent and manage these milder disturbances in ourselves and in others, to anticipate and avoid the circumstances which foster them, and to stop

their accumulating and persisting by action on the spot.

Prevention.

1. A physician should join his local Disaster Organization. Depending upon the size of the community, this should be done either directly or by making sure that the local medical society has a committee concerned with the problem, that it secures representation on the local community Disaster Organization, and that it reports back to describe progress and to tell the physicians what they should plan to do. The doctor's professional advice is essential in disaster planning at all levels, and community planning should not go ahead without his participation. Disaster organization as a whole will suffer if this is not done, and when the time comes, the physician may find that planning has failed to provide what he needs—space, equipment, facilities, organization and personnel—or has left him with a vague, poorly defined place to fill and job to do. Such planning for emergency, moreover, is as important for peacetime disaster as for war. The record of hospitals and the medical profession in some recent natural disasters has been poor and has reflected this lack of planning.

2. The doctor should know personally what he will do—as a private citizen and as a doctor. What will he do about his family? Where is he going to go and what is he going to do as a doctor? He should become completely familiar with his place in the over-all community disaster plan. He should not make his personal plans so rigidly that if things do not turn out exactly as he expected he is disorganized. He should have clear plans, certainly, so that if things turn out approximately as he expected, he can get to work without delay, but he must also *make plans to change his plans*, be prepared to adapt to changed circumstances and be flexible.

3. Familiarity with the medical possibilities of civil emergencies and of disaster is essential. This means not only a familiarity with the physical aspects of trauma or radiation, but also with their psychological and social consequences. The physician must *know what to expect of the people he will see and of himself*. A great deal can be learned from the psychological condition of people who have had serious accidents, or who have just been through some emergency. This is not only to inform himself, but also so that the doctor can inform others. People in disaster turn to the physician with questions and for help because he is a physician. The more familiar he is with the situation short of living through it, the more effective he will be in dealing with it himself and in helping others.

4. If the doctor is not in a large centre of population, this may be all the more reason for him to start planning. He will be dealing with the problems of evacuees or find himself a part of a group attempting to give aid to an affected area. The present developments place a particular emphasis upon the importance of medical planning in peripheral communities.

5. In disaster, *physicians in general can prevent many more cases of psychiatric disability than the psychiatrists can treat*.

First-Aid and Treatment.

1. Immediately following the disaster, the physician will have to remember that he is not only an individual with a family—possibly injured, possibly bereaved—but *he also fills a social role*. The role is that of physician, to whom people turn instinctively in times of severe stress. The physician has, whether he wants them or not, potentialities and responsibilities for leadership, and leadership is of central importance in dealing with disturbance and in promoting individual and social recovery. What the physician does, how he behaves, what he says to others, what he knows and what he recommends will carry great weight at this time, and be of crucial significance for others.

2. There is *psychological first-aid*¹ as well as physical first-aid. The doctor's ability to deal with the emotional reactions of evacuees and survivors will depend in large degree upon how much he has learned and how much he understands them. How he handles the transitory emotional disturbances he is to meet will greatly affect the incidence of more severe psychiatric disorders and their persistence.

3. The doctor must think of *communication*. As a doctor, seeing and treating many people, he is a vital link in the chain of communication in disaster. He must know where information can be obtained, pass on any information he obtains, and realize that he is in a position to start or stifle rumour because of his prestige and influence.

4. He should assist in the registration of survivors and evacuees. He may not have time to do it himself, but must be sure that it is done, that people however severely injured or emotional and irritating to him are given a chance to identify themselves, to have the information recorded, and to know that it will be passed on to an appropriate centre so that friends or relatives can find them.

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RADIATION INJURIES IN ATOMIC WARFARE WITH STRESS ON FALLOUT

C. G. HUNTER, D.S.C., B.Sc., M.B., M.R.C.P.,
D.P.H., D.I.H.,* Toronto

UNTIL LATE IN 1954 it was estimated that the heralded improvement of nuclear weapon efficiency had increased the ranges of the blast and thermal effects but altered relatively little the range of immediate radiations. Conceivably with atomic disasters such as the Japanese experienced in 1945, radiation injury would contribute less to the over-all casualty problem, since those near enough to be affected by radiation would already have succumbed to blast and heat injury. Then the true story of the thermonuclear explosion at Bikini on March 1, 1954, was made public. Not only were Japanese fishermen and the Marshall Islanders and U.S. servicemen 70 and 120 miles respectively from Bikini affected by radioactive fallout, but this fallout had covered an area of some 7000 square miles, within which the intensity of the radioactivity would have been lethal to half its population had the area been inhabited. The casualties in fallout zones would suffer radiation injury without the complication of burns and conventional wounds, and, salutary thought that it is, may exceed considerably the number of casualties requiring medical assistance at the area of local destruction. In brief, it is possible for a high energy weapon exploding upon a suitable soil to produce a large local devastation and shower a very much larger territory with radioactivity. In this case, to the satisfaction of the originator of the weapon, the 11% delayed (and previously dissipated) energy of the fission process is available to injure man and animals. If utilized in this manner, nuclear weapons will be more effective in reducing populations and imposing one's will on the survivors. This type of detonation must be regarded as one high on the priority scale for civil defence to combat. Truly, it is necessary for us to look anew at radiation effects and realize that medical services will be stretched to their capacity with the over-irradiated.

Radiation injury is subtle, since, except for the effects of massive doses, it is *not apparent immediately* either subjectively or objectively;

symptoms and signs develop over a period of time depending on the *amount* of radiation received and the *time* during which exposure took place. Particularly will this be so with fallout radiation injury. It is well known that acute radiation effects are less severe if radiation is given slowly; the animal organism is able to tolerate bigger doses of radiation if it is given over a period of days than if it is given in a second or two.

Close to the explosion and along the centre line of the downwind "plume" of fallout the activity tends to be higher than at the tip and at the periphery. (The Japanese fishermen and the others were affected by fallout on the *edge* of the plume.) Radioactive decay follows rapidly within the first few days after detonation. Even so, considerable doses may be accumulated by exposed personnel over short periods.

It is probable that a great portion of the exposed population downwind of a severe fallout may not be cognizant of being injured by the radiations, and unless forewarned may make little effort to reduce their exposure until appreciable injury has been received. In large animals a single isolated exposure to ionizing radiation is less lethal if early medical care is given to the animal, but where the *stress of herd existence* and *physical activity* are added to radiation injury, the chances of eventual survival are reduced. This is the great paradox with radiation casualties—if one knew who had received a considerable dose of radiation, attention could be discriminative and early, but one cannot readily diagnose radiation injury before it is expressed, especially when the dose-rate is low. Accordingly, under disaster conditions, through their own efforts for survival those injured by radiation will aggravate their injury. The earlier we recognize radiation injury in casualties, the greater the likelihood that medical care will lessen the severity of the illness and enhance survival.

MANIFESTATIONS OF RADIATION INJURY

When radiations injure the body from without they constitute an *external hazard*; when they injure the organism from within its own tissues, they are an *internal hazard*. Atomic bomb radiations produce both types of radiation hazard.

*Associate Professor, Banting and Best Department of Medical Research, University of Toronto.

External Hazard.

This causes: (1) the *general radiation syndrome*, a pattern of events following absorption of radiation from the immediate gamma and neutron radiation of the fission or fusion processes and the delayed gamma radiations from the radioactive decay of the fission products, and (2) the *superficial skin and mucous membrane lesions* called beta burns, resulting from penetration of the beta corpuscular radiation of fission product decay.

Internal Hazard.

This is due to the alpha, beta and gamma radiations associated with radioactive decay of fission products and unfissioned fissile material in the tissues. In animals this may result in symptoms of acute and subacute radiation injury akin to the general radiation syndrome, but as yet this has not been seen in man.

Problems will be presented years later as a result of both hazards when chronic effects develop. These are not casualties in the disaster sense of the word and will not be discussed any further in this article.

I. EXTERNAL HAZARD

A. The General Radiation Syndrome.

This syndrome will be the most likely injury in atomic warfare to produce serious radiation casualties, whether the weapon detonated is in the kiloton or megaton range. However, with megaton weapons the total number of casualties requiring care will be increased and, if there is fallout with considerable radioactivity, radiation injury *per se* will be manifest.

The pattern of this syndrome depends on *dose* and *dose-rate*; the greater the quantity of radiation received and the more rapid the radiation absorbed, the earlier and more severe are the manifestations of the syndrome. This holds for both whole and partial body irradiation.

The *manner of irradiation* is important too, since if radiation is given unidirectionally from an isolated source, the damage to the organism is less than if it is given from all directions. External radiation from fallout activity may be regarded as *protracted toti-directional* radiation. As such, although qualitative differences in the syndrome pattern are unlikely, these factors will alter it quantitatively. We must now review the syndrome in terms of these differing radiation factors.

Given a sufficiently large dose in a sufficiently large volume of tissue, the characteristic train of events of the syndrome follows. These manifestations have been well documented (see References) and their nature is known to most practitioners. It is proposed to discuss only those aspects of the syndrome that may be modified by radiation from fallout activity, and not to review the clinical picture. Particularly must attention be paid to the problem of diagnosis of latent radiation injury so as to institute definitive medical care and avoid the additive effect of further stress.

(i) The initial phase.

In man, quite soon after irradiation, symptoms referable to the exposure develop. Fatigue, nausea, headache and vomiting with varying degrees of prostration are experienced over the first 24-48 hours. At Hiroshima and Nagasaki, in some persons these symptoms appeared within an hour; in others, at later times during the first 24 hours. In most of the survivors these symptoms subsided within 48 hours. *The earlier these symptoms started, the longer the initial phase persisted and the worse was the eventual outcome.* In other words, the time interval from exposure to radiation until the onset of symptoms is very suggestive of the dose received. In taking a clinical history, this time interval if elicited would be a useful assessment of radiation exposure. If the rapidity of radiation (the dose-rate) is decreased, the time interval is lengthened, and with it the severity of the initial phase is decreased. Therefore not only the total dose but also dose-rate is important in the development of the initial phase, and it is conceivable that a mild initial phase may be found even though severe radiation injury eventually develops, when dose-rates are low. Thus in exposure to fallout gamma radiation, with lower dose-rates the initial phase may be protracted in its appearance and less incapacitating.

Evidence from the Marshall Islands episode supports this view. One group of 96 islanders accumulated an estimated mean air dose of 175 r in 50 hours' exposure, which indicated an initial dose-rate of some 22 r/hr. With this dose and dose-rate, development of the initial phase was protracted and the symptoms were not severe. Of this group some two-thirds felt nauseated and one in ten vomited and had mild

diarrhoea during the exposure. Other groups with doses of 98, 69 and 14 r had no initial phase symptoms.

Where massive doses of radiation are received, the initial phase advances rapidly into the picture of the *cerebral* type of radiation injury witnessed in laboratory animals. The Japanese disasters did not produce cerebral radiation injury, but further thought suggests that persons so injured may have failed to escape the fire holocaust that developed, and hence these injuries were not described. To the author, massive dose radiation injury is a frank possibility with American-type buildings, partial sheltering, slit trench and garden shelters. In these situations protection from blast and thermal effects may be present but the initial gamma and neutron fluxes may be so intense that in spite of the shielding, considerable doses of radiation will be received by the inmates within a short time. Events at Bikini in 1954 showed that 10 miles downwind on the outskirts of the area of local destruction the fallout had an intensity of 798 r/hour. Thirty-six hours' exposure at this dose-rate would lead to the accumulation of 5000 r, a dose that may be well in the range of radiation injury producing cerebral convulsions in man.

Depending on the dose received, the initial phase passes imperceptibly into the gastro-intestinal phase, or there may be a period of few symptoms before the later phases of the syndrome develop.

(ii) *Gastro-intestinal phase.*

The importance of this phase in man is unknown. Naturally if the initial phase persists prostration will follow with a shock syndrome resembling cholera, death ensuing rapidly within days as a result of water and electrolyte disturbances.

In the heaviest irradiated group in the Marshallese, by the third day symptoms referable to the alimentary tract had cleared up and all felt well. However, it is known that continued irradiation of animals does depress appetite and cause intestinal lesions which lead to large bowel dysfunction. Continued exposure in fallout areas with activity similar to the Marshallese group may therefore promote casualties with gastro-intestinal symptoms.

(iii) *Hæmorrhagic phase.*

With survival into the second and third week, the radiation casualty enters the phase of hæmor-

rhagic phenomena. The picture here was well documented in the Japanese experience of 1945. One cause for the bleeding tendency is the platelet deficiency, but it is possible in some laboratory animals to have slight or absent platelet counts *for some time before* hæmorrhages, so this cannot be the sole cause. No hæmorrhagic phenomena appeared in the Marshallese even with platelet counts as low as 35,000 and 65,000 per c.mm.;³ had these people remained in the fallout zone, hæmorrhagic phenomena would undoubtedly have occurred, but after what dose and exposure time cannot be estimated yet.

(iv) *Phase of infections.*

The white cell picture of the irradiated laboratory animal after single and continued exposure to x and gamma rays has been well presented. Japanese radiation casualties at Hiroshima showed dose-dependent depression of all the white cellular elements of the peripheral blood, maximum depression with mid-lethal exposures being from the end of the first week until the 16th to 25th day. During this period infections and ulceration of the mouth, nose and throat and the whole gastro-intestinal tract were noted. In monkeys noma and dry gangrene of the face have been seen. In the 1954 Bikini experience white cell counts fell to approximately half of normal values, but this fall was gradual, reaching maximum depression by the 6th week (Fig. 1). Evidence of granulocyte regeneration was present in each count. Fig. 1 compares the peripheral white cell counts of a sublethally irradiated adult monkey and the mean blood counts of the most severely irradiated adult Marshallese group.

With a single isolated exposure to 450 r the monkey (and there is no reason to suspect that we should react differently) presents an early marked depression of all cellular elements, most apparent during days 7-15, balanced by a pronounced regenerative upswing completed by the 35th day. Agranulocytosis was complete by the 9th day but on the 15th to 16th day neutrophil counts were three-quarters of pre-irradiation levels. The lymphocyte count fell rapidly and increased slowly, but remained at half of the former value.

The counts in the Marshallese showed a similar (but less marked) depression, mainly due to the reduction of lymphocytes. Sixty-five days later the lymphocyte count remained at values

of 50% of the normal in Marshallese as in the isolated exposure. Somewhere between these two examples will lie the peripheral white cell picture of those irradiated in the fallout zones with doses greater than the supposed 175 r air dose of the Marshallese.

Infections of upper respiratory viral type occurred in the Marshallese from the 30th to 40th day; whether the neutropenia recorded at six weeks was the cause or effect of the infection is undecided. The U.S. observers said that the

only affect herd infections if doses of radiation are in the near-lethal ranges. That does not mean that we should be complacent concerning mass artificial immunization procedures in wartime.

(v) Anæmic phase.

Single and continued exposure to gamma radiation causes failure of red cell formation and anæmia in laboratory animals. In the Japanese atomic bomb casualties (1945) aplastic anæmia developed amongst those severely irra-

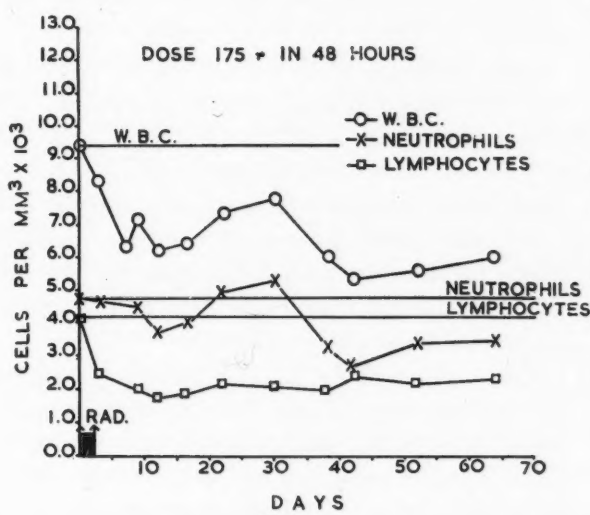


Fig. 1a

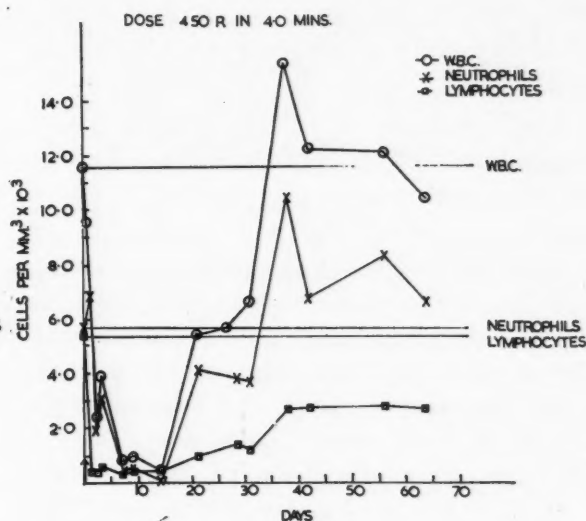


Fig. 1b

Fig. 1a.—The peripheral white cell count in the most severely irradiated Marshallese (those more than 5 years old), with average values of control groups. Fig. 1b.—The peripheral white cell counts of a multilaterally gamma irradiated monkey with mean pre-irradiation values.

infection did not differ from similar virus infections in the non-irradiated, nor did it appear to be related to the dose of radiation or to changes in the leukocyte level; this rather suggests that the sixth-week neutropenia is an effect of the infection and not vice versa.

Individual infections of the types described in the general radiation syndrome occur in the lethal radiation ranges, but the question of the possibility of epidemics in sublethally irradiated populations is as yet unanswered. All one is able to state categorically is that if a near-lethal dose of radiation has been given in a short period of time, an acute epidemic infection would be additive to the radiation injury. Where an epidemic is already extant—and our thought is that mass migrations of people and poor sanitary states will be resultants of atomic disasters—then radiation injury may play a part in propagating epidemics by lowering the herd resistance. However, more laboratory studies of higher mammalia will be needed to elucidate this. The author's opinion is that radiation injuries will

diated who survived beyond the fourth week. In the irradiated laboratory animal, anæmia may develop although white cell counts, initially depressed, have returned to almost normal values. It appears that the tissues from which white cells are formed in radiation injury recover earlier and more completely than does the red bone marrow. Anæmia is very dependent on dose, and the reticulocyte count has been suggested as a prognostic aid, a good reticulocyte response connoting probable recovery of the irradiated.

Anæmia was not a feature of any of the exposed Marshallese in 1954, but by the 22nd day after exposure the red cell mass was lower than in controls. It would appear that pronounced anæmia will not develop until doses are well within the sublethal range.

Associated with the anæmia is a raised sedimentation rate. In a small group of irradiated monkeys the author determined that a raised and rising sedimentation rate was of bad omen during and after the third week.

(vi) *Catabolic failure.*

An aspect of radiation injury not often commented on is a late catabolic failure. In monkeys appetite and food intake are depressed during the fourth and fifth week. In these animals white cell counts may be within normal limits and there may be but little depression of red cells. The animal fails to thrive and dies from a general terminal catabolic failure. In a similar way some casualties may have no marked hæmorrhagic phenomena and little evidence of infection but still die in the fourth to sixth weeks from what may be termed a general catabolic failure.

B. Superficial Lesions of Skin and Mucous Membranes

Radiation burns of the skin have followed x-ray accidents, reactor assembly discharges and contact with radioactivity, but in atomic warfare radiation skin lesions have not been described. The Japanese in 1945 did not experience casualties with this type of injury, and most authorities inclined to the view that fallout activity would be so dispersed and dissipated even with near ground bursts that the opportunity for frequent production of this type of radiation injury did not seem likely. With the example of the 1954 fallout before us, however, we must expect skin and mucous membrane lesions in gamma-irradiated people of the fallout area to complicate and add to the clinical picture.

In the Pacific accident, investigation has revealed that the skin lesions were most severe where the fallout was most dense. Those Marshallese were most affected where the fallout was compared to powdery snow. The skin lesions are produced by the absorption of beta corpuscular radiation in the skin and mucous membranes. The *depth of penetration* before absorption is determined by the energy of the beta particles. It is indeed fortunate that, if one may accept the Marshall experience as a probable one, the fission product beta particles have relatively poor penetrating power, skin lesions being superficial and rapidly healing. If the beta particles had been more energetic, the lesions would have been deeper and healed indolently, a much more serious casualty prospect.

Beta particle radiation injury may produce local and constitutional effects.

(1) *Constitutional Effect.*

This is an unlikely event in atomic warfare since beta particles are in most cases associated with gamma rays, injury from which would overshadow any local injury, but severe constitutional effects leading to acute death may be demonstrated in animals after pure beta irradiation. If the dose is big enough, the animal dies from toxæmia and metabolic failure *even before the skin lesions become evident.*

(2) *Local Effects on Skin and Mucous Membrane.*

Injury to the mucous membrane of the respiratory tract has followed the inhalation of radioactive aerosols by animals. Ulcerated areas arise at places where the lining mucus is concentrated—the anterior nares, nasopharynx and larynx. No mention is made of this variety of lesion in the Marshall Islanders, so we must conclude that in their case little fallout entered the upper respiratory passages.

The skin is likely to be damaged from the presence of overt fallout material as it descends. Almost all of the most severely affected group of Marshall Islanders had skin lesions. Indeed theirs may yet be a unique experience if further detonations of this type do not take place.

The probable clinical picture may be understood more clearly if the events at Bikini are followed. For 12 hours, fallout continued intermittently and not until 48 hours afterwards were active decontamination measures initiated. U.S. servicemen who took the precautions of remaining indoors, discarding their clothing, and washing, developed few skin lesions; whereas the natives who were unaware of the danger had skin lesions that necessitated medical treatment. Four symptomatic periods were described in their case.

(a) *The initial period.*—Symptoms referable to presence on the skin of fallout were complained of by 25% of the afflicted. Itching and burning sensations and lacrimation were the main complaints. The areas most affected were the exposed skin, scalp, nape of the neck, moist areas and the dorsum of the naked foot. Brushing off the material and washing in the sea led to relief and the onset of:

(b) *The quiescent period.*—During this period no complaints were made for 14-16 days.

(c) *The period of lesions.*—Here, for several days, epilation and desquamation of the affected

areas took place. The most severely affected areas had a weeping eczematous appearance (Fig. 2). On the dorsum of the feet some cases had bullæ which progressed to ulceration (Fig. 3). No lesions resulted on the palms of the hands and the soles of the feet.

(d) *Period of healing.*—The lesions, except for the ulcerated areas, healed rapidly and completely. The only evidence of the burns after a month or two was nail pigmentation and some depigmentation of the skin over the deeper burnt parts. This picture differs from those previously described in lack of erythema, and the rapidity and completeness of the healing process; the difference is ascribed to the damage being produced by low energy beta irradiation.

The salient features of fallout burns in these cases were: (1) initial symptoms on exposed parts; (2) a quiescent period, and minor skin lesions appearing after the 14th day which healed rapidly. Though incapacity may not be present, the nuisance value of such skin lesions in some thousands of people is obvious.

The additive effect of beta and gamma irradiation is known in animals but not in man. In the case of the Marshall Islanders no constitutional effects resulted at the height of eruption of the skin lesions, and the presence of skin lesions did not appear to enhance the acute radiation syndrome effects already present.

II. INTERNAL HAZARD

Great prominence has been given to the long-term effects in man of possible absorption and incorporation in the body of fission products. Little interest has been taken in the internal hazard from fallout as a cause of immediate casualties in warfare, probably because it has been felt correctly that the external hazard is more important.

In animals, however, the entry of small amounts of soluble radioisotopes may cause acute lethal effects, the animal dying even before the 30th day. The picture here is one of both external and internal hæmorrhages and catabolic failure. Depression of leukocytes and red cells follows beta particle irradiation of the bone marrow. Man would die early after doses of soluble radiostrontium in the vicinity of 1.0 millicurie per kg. bodyweight. Smaller doses would lead to death at longer intervals, from aplasia of the bone marrow causing aplastic anæmia.



Fig. 2.—Neck lesions at 28 days. Wet desquamation. White colour is calamine lotion.

The Marshall Islanders, although absorbing fallout activity through their food and drink, did not suffer an internal hazard sufficient to produce any immediate injury. Most of the fallout in their case was relatively insoluble and it was estimated that the alimentary tract was exposed to a maximum activity of 3 millicuries of mixed fission products.

Another problem to be considered is of the food chain of the domestic animal and man—herbage → animal → man. A grazing animal will concentrate in its body within a short time the activity of many square metres of pasture. Passage of this activity, in particular the short-lived isotopes of iodine and the longer lived ones of strontium, into the milk may cause body burdens of these fission products which in the



Fig. 3.—Hyperpigmented raised plaques and bullæ on dorsum of feet and toes at 28 days. One lesion on left foot shows deeper involvement. Feet were painful at this time.

infant may have a far-reaching effect—the development of neoplasia years later.

The problem in wartime will be how much the internal hazard will add to the external hazard. Certainly it is very apparent that, *where the external hazard is down to reasonably safe levels, no internal hazard will follow continued residence in a contaminated area.* If the Marshallese experience is a probable one, then it is unlikely that with the better sanitary state of Western peoples the internal hazard will be additive to the damage already scored by the external hazard.

III. PRESENTATION OF RADIATION INJURIES

Casualties will present with:

(A) Radiation injury developing at varying intervals as a complication in casualties from conventional burns and wounds.

(B) Uncomplicated radiation injury. Particularly will this latter type be seen where there is heavy fallout contamination. Classification may be according to *time of presentation* for medical treatment, and *doses of radiation received*.

<i>Predominant pattern</i>	<i>Time of presentation</i>	<i>Dose/exposure time</i>
Cerebral radiation injury	Early (within hours)	Massive doses/short
General radiation syndrome		
(a) immediate gamma radiation (1945 Japanese type)	Within days	Moderate/short
(b) fallout gamma radiation (1954 Bikini type)	Within weeks	Moderate/long
Superficial skin and mucous membrane lesions	Later (within weeks)	Moderate/long
Long-term effects (from external and internal hazards)	Very late (within years)	Moderate/any exposure time
and any combination of the first three pattern groups.		

Just how the radiation casualties from the fallout contaminated areas will present themselves is conjectural. The degree of rapidity of development of the general radiation syndrome depends on the dose and time during which exposure occurred. A large dose of radiation in a short time will produce casualties with the characteristic pattern of the acute general radiation syndrome; the same dose accumulated over days may not be sufficiently injurious to cause the acute syndrome, and skin lesions may be

the presenting injury. Probably the symptom pattern of events of radiation casualties will lie between those reported in the Japanese in 1945 and the Pacific accidents of 1954. Again, certain age groups of the irradiated population will react differently; youth and age are more susceptible and may present the syndrome picture with greater clarity than the remainder of the population. The pregnant female will abort with big doses, but with lower doses it does not appear that pregnancy will be interrupted. People whose red cell mass is reduced by anaemia and whose activity is largely physical will be affected earlier than those of sedentary habitus. Thus presentation of radiation injury will be individual due to the variable sensitivity of the irradiated.

If *dose* may be taken as a yardstick for assessing radiation injury, it is apparent that doses in the sublethal range must be received within a short time before overt radiation casualties are caused. If the same dose is received over a longer period, radiation casualties requiring treatment are unlikely. Local or constitutional effects sufficient to interfere with normal existence must be exhibited before casualties will attend for medical care. If no symptoms are complained of, in spite of signs denoting previous exposure, few casualties will require medical care and the radiation injury will probably go on to rapid and eventual full recovery.

IV. DIAGNOSIS

Notwithstanding the above comments, diagnosis and estimation of the degree of latent radiation injury are necessary. To do this, medical practitioners will need to know the clinical picture even though good individual and area dosimetry is available.

Radiation casualties should be classified into three groups: (i) lethally irradiated; (ii) potentially lethally irradiated; (iii) sublethally irradiated. We should be most concerned with the middle group, in which earlier diagnosis will lead to more expeditious medical and nursing care. Clinical acumen will be required, since no accurate biological dosimeters are known and biological values showing marked departure from the normal are found only in those whose sickness is clinically apparent already. We should not be too sanguine about responses to our therapeutic efforts in the general radia-

tion syndrome. High hospital mortality rates (60-70%) for radiation injuries must be expected, which suggests that in disaster conditions the severely irradiated will be admitted earlier than the middle group to treatment centres, only to die. The slope of dose mortality curves of all irradiated mammalian species is very steep; an increase of dose causes a sharp rise in lethality. Hence relatively less response should be expected with medical care of human radiation casualties as the dose absorbed is increased; with a 100% lethal dose very few will survive with optimum attention, whereas with a 30% lethal dose and good medical services the lethality may be reduced by 20%.

Clinical History.—The importance of the severity and time relationship of the initial phase has been mentioned. The tempo of onset of the illness and the physical ability of the casualty are valuable aids in the clinical history.

Laboratory Investigations.—Probably most useful information will come from peripheral blood investigations. Blood counts on admission and repeated will indicate the severity of radiation injury.

1. Initial lymphocyte depression and persistent low daily values suggest that considerable exposure has taken place.

2. Absence of granulocytes during the second week would indicate doses in the lethal ranges.

3. Absence and depression of platelet counts suggest near-lethal doses and the necessity to guard against hæmorrhagic phenomena.

4. A reticulocyte response after the third week is a valuable prognostic guide.

5. The hæmatocrit value will evaluate red bone marrow damage in the absence of bleeding, and a raised sedimentation rate beyond that referable to the anæmia connotes severe tissue damage and the presence of a catabolic state.

Other complicated investigations may be useful in assessing exposure in isolated cases but with mass casualties they will be impractical. Such tests include iron uptake by the bone marrow and the inhibition of certain blood enzymes.

Finally, where casualties presenting with burns and wounds from secondary missiles fail to respond to good therapy, thought should be given to the likelihood of overt and latent radiation. The effect of this is additive, and sublethal wounds or burns will become lethal when radiation injury is present also.

SUMMARY

Immediate radiation will cause casualties along with the thermal and blast effect of atomic weapons in the area of local devastation. With radioactive contamination from fallout of megaton weapons the delayed radiations will cause uncomplicated radiation casualties.

Hazards in fallout areas will be both external and internal. The external hazard will cause casualties with the clinical picture of the general radiation syndrome, the acuteness of which depends on dose and dose rate, and superficial beta burns. The internal hazard is unlikely to cause radiation casualties. The question of summation of these effects has been discussed.

The general radiation syndrome will be the radiation injury of greatest importance in fallout zones. This will present with a clinical picture between the recorded events of the Japanese in 1945 and the Marshallese in 1954. Diagnosis of radiation injury does not necessarily mean a treatment problem, but early estimation of the degree of injury will permit maximum therapeutic attention to those most likely to benefit from this.

Assessment of radiation injury is predominantly clinical, but certain laboratory tests may help in diagnosis of latent injury and the prognosis of overt injury.

The author wishes to thank the Superintendent of Documents, U.S. Govt. Printing Office, for permission to reproduce data incorporated in Fig. 1 from "Some Effects of Ionizing Radiation on Human Beings" (Cronkite, Bond and Dunham), L.S., A.E.C., 1956.

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LEVELS OF ACCEPTED RADIATION EXPOSURE FOR A WAR EMERGENCY

F. C. PACE, M.D.,* *Ottawa*

THE INTRODUCTION of high-yield atomic weapons ("hydrogen bombs") as a normal threat in warfare has altered our conception of the associated radiation hazards very radically. The relatively small weapons used against Japan caused acute radiation injury to a small proportion of the surviving casualties in the immediate target areas and none at distances beyond a mile and a half or two miles from ground-zero. The large modern weapons, however, are capable of distributing radioactive debris as fallout or residual radiation over areas of several thousand square miles, so that the hazard of radiation injuries is now considered as great as those arising from the effects of blast and heat. However, it is desirable to evaluate this danger quantitatively and to relate (if we can) definite doses of radiation to degrees of biological damage.

In attempting to do so, the first consideration is, *what radiations should we attempt to measure?* There are two groups of bomb-radiations to consider: first, highly penetrating species which cause, in the human target, the acute radiation syndrome, and second, poorly penetrating radiations which produce skin burns. The main component of the highly penetrating group is the gamma ray; those of the poorly penetrating kind are beta particles and "soft" x-rays.

Gamma rays are emitted by the detonating event of an atomic weapon and from the fireball which is formed immediately after. From this source, there is presented an immediate hazard. They also arise from the radioactive fallout characteristic of certain types of burst (notably those of very powerful weapons) to contribute to the residual hazard.

Beta particles (actually high-energy electrons) arise from the fallout, as do other poorly penetrating rays. While there are other ionizing radiations from atomic weapons, these are the only ones we need consider within the parameters of practical medicine in war.

Our second consideration is, *how are these radiations to be measured?* Obviously, they are

measured by instrumental means. But the instruments available measure radiations in the surrounding air; they do not tell us how much energy is absorbed by a biological system. And, since the quantity of radiant energy absorbed by a living being is the primary controlling factor in all changes—pathological, clinical and genetic—which subsequently appear, the best correlation we can hope for at present is a measurement on an instrument with a later somatic (or genetic) observation. This means that we must accept approximations; we cannot say that so many roentgens will produce vomiting, so many a necrosis of the gastro-intestinal epithelium, or so many, death within a month. All an instrument can do for us, clinically, is to tell us that it is probable that a particular patient has received a great deal of radiation, a moderate amount or very little. Technological data do not replace the well-proven clinical procedures—a good history and a careful physical examination. Where unusual circumstances have to be faced, interpretation of exposure data should be provided by Health Services. A few radiologists should be designated to assist in such interpretations, but their number must be limited since a majority of the members of this specialty will be required for diagnostic work in relation to traumatic casualties.

A third factor is *the time over which a given quantity of radiation is delivered to the individual*. In 20 years' work in atomic industry, at a low daily exposure-rate, a worker will absorb perhaps two or three hundred roentgens without observable illness. But if a man received like quantities in a short period, say within two days or less, he would undoubtedly be very ill. Associated with this concept of time-dose relationship is that of whole-body radiation. In atomic war, the worst assumption is made, viz., that any measured amount of radiation represents exposure of the whole body and not of a limited part. And because wartime exposures will presumably be short, one is justified in thinking mainly of short-time radiation exposure to the whole body.

On this basis, and with the above limitations of certainty in mind, a number of tables of exposure effects have been set out in the literature. One, for acute exposure to gamma radiation, appeared in the American publication *Effects of Atomic Weapons*.¹ This table was devised for guidance of commanders in fore-

*Medical Consultant, Special Weapons Section, Civil Defence Health Services, Ottawa.

TABLE I.—PROBABLE EARLY EFFECTS OF ACUTE RADIATION DOSES OVER WHOLE BODY

Acute dose	Probable effect
0 - 25 r.....	No obvious injury.
25 - 50.....	Possible blood changes but no serious injury.
50 - 100.....	Blood-cell changes, some injury, no disability.
100 - 200.....	Injury, possible disability.
200 - 400.....	Injury and disability certain, death possible.
400 - 600	Fatal to 50%.
600 - or more	* Fatal.

telling and controlling casualty effects and is reproduced here (Table I).

Simplifications and elaborations of this table have appeared in many texts and handbooks. The writer had for some time the impression that doses up to 50 roentgens during an operational period could be accepted for Services and civil defence working personnel; that 100 to 200 roentgens would produce some sickness and that 400 roentgens would represent a 50% chance of death within 30 days. Support for these views has been offered by reports of the fallout accident in the Pacific on March 1, 1954, when the radioactive cloud from a very powerful atomic weapon was carried off its prophesied course. Some Japanese fishermen, some American servicemen and a considerable number of natives of the Marshall Islands were caught in the fallout. An exhaustive report on this accident has been published recently by the United States Atomic Energy Commission.² The most heavily exposed group (64 natives of the island of Rongelap) received a total gamma dose of about 175 r in 50 hours (when they were evacuated); the response was radiation sickness

in a majority of this group and characteristic blood changes in all. There were no deaths, but the authors conclude from the blood changes observed that the dosages received were approaching the lethal range. A Japanese report³ on the crew of the fishing vessel indicates that the 23 men of the ship's complement received (by calculation) about 250 r; all were sick and one died later. (The death may have been due to serum jaundice following transfusion.) From these clinical observations, it is reasonable to conclude that acute exposure to gamma dosages at levels of 150 to 250 roentgens measured in the air surrounding the subject will, in healthy adult subjects, produce definite radiation sickness in the majority.

The dose-effect table set out in the American publication cited, based on data from various sources (including animal data), is reproduced in Table II.

This seems as good a practical guide as anything we have for the present, but it should be accepted conservatively and with reserve.

So far, this review has been limited to the effects of highly penetrating radiations. The beta particle ("ray") is likely the most important contributor to the effects of the poorly penetrating radiations from weapon-fallout, that is, to the production of skin burns. Outside the laboratory there is no reliable or satisfactory method of measuring the dose of beta emanations; indeed many authorities state bluntly that it is impossible and unnecessary under field conditions. However, there is some clinical evidence that where the dosage of penetrating gamma irradiation is sufficient to cause appreciable sickness, there is also a probability of skin injury from the soft components. Ninety per cent of the more severely exposed groups of Marshallese natives developed skin lesions of varying severity² after the 1954 accident, as did (apparently) all of the Japanese fishermen involved in the same fallout situation.³ But it must be remembered that most of these people did not take steps to keep the radioactive dust off their skins, or to cleanse themselves soon after the dirt fell on them, and it is more than likely that their injuries were due to direct contact between skin surface and radioactive material. Because the soft rays are absorbed in air rather readily and more readily by denser material (e.g. clothing), it is perhaps wise and

TABLE II.—EFFECTS OF ACUTE TOTAL BODY IRRADIATION ON HUMAN BEINGS

50 r.....	No casualties. No reduction in effectiveness.
100 r.....	Two per cent may be casualties (nausea and/or vomiting) for short period of time. No evacuation contemplated. No significant reduction in effectiveness.
150 r.....	Twenty-five per cent casualties in a few hours. First definite reduction in effectiveness. Fifty per cent of the casualties in this group will have to be evacuated.
200 r.....	All must be evacuated as soon as possible. Fifty per cent will be noneffective.
300 r.....	Approximately 20% deaths. All need evacuation immediately. All are noneffectives.
450 r.....	Fifty per cent deaths.
650 r and over....	Lethal dose, but not necessarily for all so exposed.

practical to centre attention mainly on effects of penetrating rays and to direct our interest in the soft rays towards preventing skin burns by protection or cleansing when necessary. Nevertheless, there is some evidence that very high beta-ray doses are necessary to produce skin injury of the order of hundreds to thousands of roentgen-equivalent units,⁴ and such high doses of the soft component likely are present in the weapon-fallout field.

One additional type of wartime radiation hazard should be considered, viz., the internal hazard arising from the ingestion of food or drink contaminated by fallout or by inhalation of radioactive dust-particles. This has been the subject of much study and speculation. The guidelines are to be found in the strict limits set for radiation industry.⁵ In the Marshall Islands incident, however, it has been found that, even under the worst conditions of knowledge of radiation-safety and protection of food and drink, the quantities of radio-poisons taken up by the natives have not exceeded the severe industrial safety standards. For the present, then, we need not be gravely concerned about the internal radiation hazard in war; sensible precautions are indicated to prevent unnecessary contamination of food and water supplies and radiation surveys are desirable, particularly of open water sources (reservoirs), to reduce a possible long-term public health hazard. But it is hard to conceive of a situation where so much radioactive material would gain access to the body as to cause early disability, and it is early disablement, not late somatic or genetic effects, with which we are concerned here. The complicated techniques of radio-chemical analysis are certainly not applicable in a war situation.

SUMMARY

The levels of radiation exposure acceptable in a war situation are greater by several orders of magnitude than are those applicable in peaceful uses of x-ray, radiation industry and research. In war we are concerned with preserving operational effectiveness and with preventing wastage through uncontrolled exposure of personnel, not with long-term somatic or genetic effects. The tables set out above can be accepted, with reservations, as guides for these purposes until more reliable data become available. The tables are based on the probable

effects on man of relatively acute exposures of the whole body to penetrating gamma rays. The associated hazard of exposure to the poorly penetrating beta rays cannot be summarized satisfactorily at the present time; however, the existence of the hazard must be remembered and it must be dealt with by preventive measures. The internal hazard exists, certainly, but available evidence indicates that it is not serious, though again preventive measures are indicated.

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COMPROMISES IN THERAPY OF BURNS SUSTAINED IN NUCLEAR WARFARE

In the event of a mass casualty situation involving the use of nuclear weapons, it is obvious that major compromises in burn therapy will be necessary. These compromises will be mandatory in all phases of burn therapy, from early resuscitation to late grafting procedures. In the early phase, therapy to be considered includes (1) oral electrolyte therapy, (2) use of the exposure method except when an individual might be rendered effective by the use of dressings, (3) omission of local wound care involving an operating room, (4) orally given antibiotics, (5) self-care or "buddy system" treatment for all burns involving less than 15% of the body surface except in critical areas such as the face and feet, (6) concentration of care for casualties having burns involving 15 to 40% of the body surface, and (7) low priority for evacuation and treatment for all persons with more than 40% of their body surface involved, provided most of the burn is a full-thickness burn. In the later phases, therapy to be considered includes (1) cadaver homograft skin applied as a ward procedure, (2) autografts applied in postage-stamp size rather than in sheets, (3) protein supplements by oral ingestion, (4) first priority for grafting of patients with small areas of burns because of early discharge from the burn centre, and (5) delay in grafting procedures on many casualties beyond the optimal period. In time of disaster, it will be impossible to excise all full-thickness burns or initiate routine rehabilitation.—R. D. Pillsbury and C. P. Artz, *J. A. M. A.*, 162: 956, 1956.

MEDICAL CONTROL OF EPIDEMICS, INCLUDING BIOLOGICAL WARFARE

MILTON H. BROWN,* M.D., D.P.H., *Toronto*

THE SUBJECT OF biological warfare as it pertains to man was outlined in the previous civil defence issue. Since that time there have been a number of developments which suggest reconsideration of the subject. In this discussion the newer aspects will be developed. In the past the use of biological warfare against man has usually been looked upon as either a real possibility and of great potential or dismissed as being completely unrealistic. There is an increasing body of opinion which indicates that as the result of technical improvements biological warfare could be a very powerful weapon and hence requires serious consideration.

The concept of defence against thermonuclear weapons has altered, and now the official policy is to carry out mass evacuation of the population from target areas in the event of an impending attack. This adds a whole new problem, completely foreign to anything experienced previously in North America in the event of war.

In the light of this new situation it will be seen that not only may implanted disease or biological warfare become a problem but also naturally occurring diseases may get out of hand as the result of marked overcrowding of reception areas by evacuees and complete destruction of urban centres as a result of a thermonuclear attack. One has only to draw on the imagination to anticipate what might happen in reception areas if a half-million evacuees from any one of our two largest Canadian cities were suddenly evacuated into the surrounding communities with a resulting overcrowding of at least five to one of the present accommodation. Add to this the occurrence of such an event during the winter months and the problems are multiplied.

DEFINITION

Biological warfare may be defined as the offensive and defensive military use of disease, famine and pestilence, produced by means of

bacteria, viruses, rickettsiae, fungi, insects, hormone-like chemical substances and other agents. It is the production of death or disease on a mass scale in man, animals, and plants under conditions which do not exist in nature. This discussion deals only with biological warfare against man.

POSSIBLE BIOLOGICAL WARFARE CANDIDATE AGENTS

The number of micro-organisms or agents that might be used is considerable. The following is a list of these agents taken from that set out in the Civil Defence Health Services Manual, Section "O":

BACTERIA

Bacillus anthracis (Anthrax)
Shigella dysenteriae (Bacillary dysentery)
Brucella group (Brucellosis)
Vibrio comma (Cholera)
Pasteurella tularensis (Tularaemia)
Pasteurella pestis (Plague)
Malleomyces mallei (Glanders)
Salmonella typhosa (Typhoid)
Salmonella typhimurium (Paratyphoid)

VIRUSES

Psittacosis virus or rickettsia (Psittacosis)
Encephalitis and encephalomyelitis viruses (Encephalitis or encephalomyelitis)
Influenza virus (Influenza)
Variola virus (Smallpox)
Yellow fever virus (Yellow fever)

RICKETTSIAE

Rickettsia prowazeki (Epidemic typhus)
Rickettsia typhi (Endemic typhus)
Rickettsia tsutsugamushi (Scrub typhus)
Rickettsia rickettsii (Rocky Mountain spotted fever)
Coxiella burnetii (Q fever)

FUNGI

Coccidioides immitis (Coccidioidomycosis)
Histoplasma capsulatum (Histoplasmosis)

TOXINS

Botulinum toxin (Botulism)
Tetanus toxin (Tetanus)

It is not possible to predict with any accuracy what biological warfare agents an enemy might use, as this depends upon many factors such as the ability to produce them in large quantities and proper stabilization for large-scale distribution. Agents which are highly dangerous in the laboratory may be completely ineffective when prepared and distributed in an aerosol over a wide area and exposed to the elements. The intention of the enemy to use a highly lethal agent and thus produce a high mortality in contrast to an agent producing low mortality and high morbidity will influence the choice of the agent.

*Professor of Public Health and Preventive Medicine, University of Toronto.

With these things in mind there are some agents which might seem suitable: of the bacteria those causing anthrax, tularæmia, brucellosis, and plague; of the viruses and rickettsiæ those producing psittacosis, yellow fever, Q fever and typhus fever; and it may be possible to use the non-living biological toxins of those producing botulism and tetanus.

A combination of any of these agents might produce a most confusing clinical syndrome.

COMMUNICABLE DISEASES WHICH MIGHT
OCCUR OR RECUR NATURALLY IN THE
CANADIAN POPULATION WHEN GROSSLY
DISTURBED BY CONDITIONS OF MODERN WAR

It has been said that even if biological warfare were never used in modern war the health and medical problems which would beset a suddenly evacuated population of any of our large cities would be formidable, but with planning and due preparation they can be drastically minimized if not completely prevented.

It is difficult to visualize for the Canadian scene what the problems might be, but experience amongst the civilian population in Europe and elsewhere in past wars should serve as a guide. Towards the end of the first great war a pandemic of influenza swept across Europe and around the world with devastating effect. What part the effects of war played in the spread of this disease is not known. It may have been considerable. During the war of 1939-45 in western Europe diphtheria became pandemic, the incidence of enteric fever was markedly increased, and infectious hepatitis increased as a problem. In eastern Europe the incidence of tuberculosis increased enormously.

Thus in the event of mass evacuation of our Canadian cities the gastro-intestinal infections, including such conditions as food poisoning, typhoid and paratyphoid fevers and infectious hepatitis, might become problems. With the widespread use of poliomyelitis vaccine, and especially if it is used in the young adult population, the possibility of this condition being a problem is remote. Of the respiratory infections it is conceivable there would be an increased incidence of the so-called "minor" communicable diseases such as mumps, measles (rubella and rubeola) and chickenpox, and if complicated by staphylococcal or streptococcal infections there would be a serious problem.

The possibility of epidemic viral influenza complicated by an infection with an antibiotic-resistant staphylococcus is something to keep in mind. The part played by the recently isolated Coxsackie viruses and adeno-viruses in producing morbidity is not clear. The question of diphtheria should be considered especially in the adult population, as from 30 to 40 to 50% of adults are not immune. This is a disease which is completely preventable if adequate immunization is maintained.

A protracted state of overcrowding and undernourishment could lead to a resurgence of the problem of tuberculosis. The insect-borne diseases, such as western encephalitis, Rocky Mountain spotted fever and plague, are to be thought of in the western provinces.

With a shortage of soap and bathing and washing facilities, staphylococcal skin infections and scabies might add further troubles to an already troubled population.

PROTECTION

Though the array of biological warfare agents which might be used is formidable, there is some comfort in the fact that a number of antigens are now available which produce a good state of immunity under ordinary conditions, although it is not too clear what they will provide in the way of protection when disease-producing agents are spread about in an abnormal manner such as by aerosol and thus gain entrance to the respiratory system. The antigens included in this group are small-pox, yellow fever, BCG and typhus vaccines, diphtheria toxoid, tetanus toxoid, poliomyelitis, TAB and cholera vaccines.

Antigens can be prepared for use against anthrax, botulism and Q fever and have been developed to a stage where they could be made available for large-scale administration.

The antitoxins and sera for passive immunization and the wide variety of antibiotics and chemotherapeutic agents lend further hope in meeting the awesome task of controlling disease under contemplated conditions of war, particularly if thermonuclear weapons and biological warfare are used. Gamma globulin, though in rather limited supply, is useful for passive immunization against infectious hepatitis and most of the "minor" communicable diseases. Diphtheria and tetanus antitoxins

should be available for those unfortunately not actively immunized against these diseases.

Penicillin and the broad-spectrum antibiotics either alone, in combination, or with some one of the sulfonamides, particularly sulfadiazine, have been found to be helpful in the treatment of anthrax, especially the cutaneous form, bacillary dysentery, glanders, plague, psittacosis, typhus fever, and scrub typhus.

MASS IMMUNIZATION

The most perplexing problem is when to use these antigens for active immunization. There is no ready answer to the question of mass immunization. The necessity of giving two or three doses at weekly or monthly intervals in order to actively immunize against most diseases means that this procedure must be carried out well in advance of the exposure to the disease-producing agent. The question of booster doses is to be considered if there is considerable lapse of time following primary immunization.

It does seem reasonable to encourage extensive use of well tried and commonly employed antigens such as smallpox vaccine, DPT (diphtheria toxoid, pertussis vaccine, and tetanus toxoid), and more recently poliomyelitis vaccine, and at the appropriate time TAB vaccine and BCG vaccine.

The large-scale use of yellow fever vaccine, Q fever vaccine and other vaccines will have to await further information. The Civil Defence Health Services of the Department of National Health and Welfare is being advised by a committee on biological warfare protection and related topics, and subsequently will have information available on this subject.

RECORDS

The present-day use of many antigens in the immunization of infants and children has raised the problem of maintaining a record of the injections given. This problem is of particular concern in the use of DPT and subsequent booster doses of tetanus toxoid in the control of tetanus. If and when mass vaccination of the population is carried out, recording will be equally important. There is no simple solution to this problem. The services have solved it quite satisfactorily by providing the serviceman with a record book in which notations of injections are made. If identification discs are issued to civilians, a code letter could be imprinted

thereon for special antigens, taking for granted that routine immunization has been carried out. This procedure has been adopted in the military services of one country and it has worked very satisfactorily.

DETECTION

Defence against biological warfare or any epidemic depends upon a system for collecting at the earliest possible time information concerning an outbreak of disease or a condition, together with the isolation and identification of the etiological agent.

The department of public health is normally charged with this responsibility as far as it concerns disease in the human. It would be folly to set up a separate organization to function in war, and accordingly the whole system of detection and control of epidemics in war is to be co-ordinated with the existing public health organization. Likewise, for diseases of animals and plants the department of agriculture will continue its usual role of detection and control of these diseases.

The reporting of communicable diseases among humans is mainly a provincial matter. That is, the physician reports to the local medical officer of health, who in turn reports to the provincial department of health. The latter reports to the Dominion Bureau of Statistics and in special circumstances to the Department of National Health and Welfare. In this way all levels of health departments are informed of existing conditions (see Appendix II).

Reporting of diseases of animals is carried out entirely under a federal system of statute. Under the Animal Contagious Diseases Act the federal department of agriculture is responsible for the collection of information and control of animal diseases which would be of importance in the event of biological warfare. To control the so-called zoonoses will require the interchange of information between these two departments. This calls for the closest co-operation between the local officers of the federal department of agriculture and the local medical officer of health. It is at the local level where it is of the greatest importance that the closest possible liaison be carried out. Fortunately in war or time of disaster most if not all of the human barriers to such co-operation disappear and there is complete interchange of information.

THE ROLE OF THE LABORATORY

We are especially fortunate in this country in having a well-established diagnostic laboratory service both in hospitals and public health laboratories as well as the Laboratory of Hygiene and the Special Virus Laboratory in Ottawa to deal with the micro-organisms commonly seen in this part of the world. It is the identification of the exotic agents or those requiring special techniques which poses a serious problem. A supply of antigens and antisera for the identification of exotic or unusual disease agents must be made available to the diagnostic laboratories where they may be held in readiness. The commonly employed methods of identification are in the main time-consuming. There is a great need for more rapid methods of detection and identification of the agents which might be employed.

The Civil Defence Health Services of the Department of National Health and Welfare are being advised on these problems by a committee and have assumed responsibility for the supply of these materials as well as making available information on technical developments.

REPORTING

There is a need for a system of centripetal reporting of micro-organisms isolated in the diagnostic laboratories followed by centrifugal dissemination of such information in order that the municipal and provincial civil defence organization be apprised of changing events. It has been suggested that laboratories be provided with a report form and by simply checking the micro-organisms isolated in any given week and forwarding to a municipal, provincial and subsequently federal centre, background information will be supplied against which anything unusual would be quickly detected. This merits study, and the suggested list is to be seen in Appendix I.

The reporting of communicable diseases by the physician through the usual channels plus the reporting of the isolation of micro-organisms by laboratories would add considerably to our methods of detection.

THE ROLE OF THE PHYSICIAN

Despite all efforts to improve the methods of early detection by technical or laboratory methods, the practising physician will be the most important factor in producing evidence of

a biological warfare attack. The physician will be in a very strategic position. He will be aware of the existing conditions in his community and as soon as he sees any unusual case or there is a sudden unexplained increase in the incidence of any disease, his position is clear-cut. The reporting of communicable diseases to the local medical officer of health is of the utmost importance, especially if conditions have deteriorated and war seems inevitable. A medical profession fully alerted to the possibilities of biological warfare will serve as one of the most important aspects of defence.

PUBLIC EDUCATION

There is a need for the education of the public on the problem of disease control in the event of mass evacuation because of the use of thermonuclear weapons or biological warfare. This is a problem beset with great difficulties if it is not to create panic or despair, and it is something which will require considerable study and planning before an educational campaign is undertaken.

On the other hand, it is reasonable to assume that if the population is previously indoctrinated on the prevention of disease and adequate disease control measures are developed, the effects of such a situation will be markedly reduced and the rehabilitation of the country will be materially aided after disturbance by any form of mass destruction attack.

APPENDIX I

Suggested List of Micro-organisms for Reporting (as outlined by Dr. Hugh Starkey)

BACTERIA

- Bacillus*—anthracis
- Brucella*—abortus
melitensis
others
- Clostridium*—botulinum
tetani
gas-gangrene group
- Corynebacterium*—diphtheriae (type?)
- Haemophilus*—influenzae
- Leptospira*—from hepatitis
from CNS
- Malleomyces*—mallei
pseudomallei
- Mycobacterium*—tuberculosis
leprae
other pathogens
- Neisseria*—meningitidis
- Pasteurella*—pestis
tularensis
others
- Salmonella*—typhosa (type?)
others
- Shigella*—dysenteriae
flexneri
others
- Spirillum*—from relapsing fevers
others

Vibrio—*comma*
others

RICKETTSIA AND VIRUSES (by isolation or immunological evidence)

Rickettsia—*typhi*
rickettsii
tsutsugamushi
burneti
others

Viruses—poliomyelitis
Coxsackie
equine encephalomyelitis (East, West)
St. Louis encephalomyelitis
Japanese B encephalomyelitis

—other neurotropic viruses (not proven)
influenza
psittacosis—ornithosis
APC group
—other respiratory viruses (not proven)
yellow fever
hepatitis (infections or serum suspected)
smallpox
—other generalized virus infections

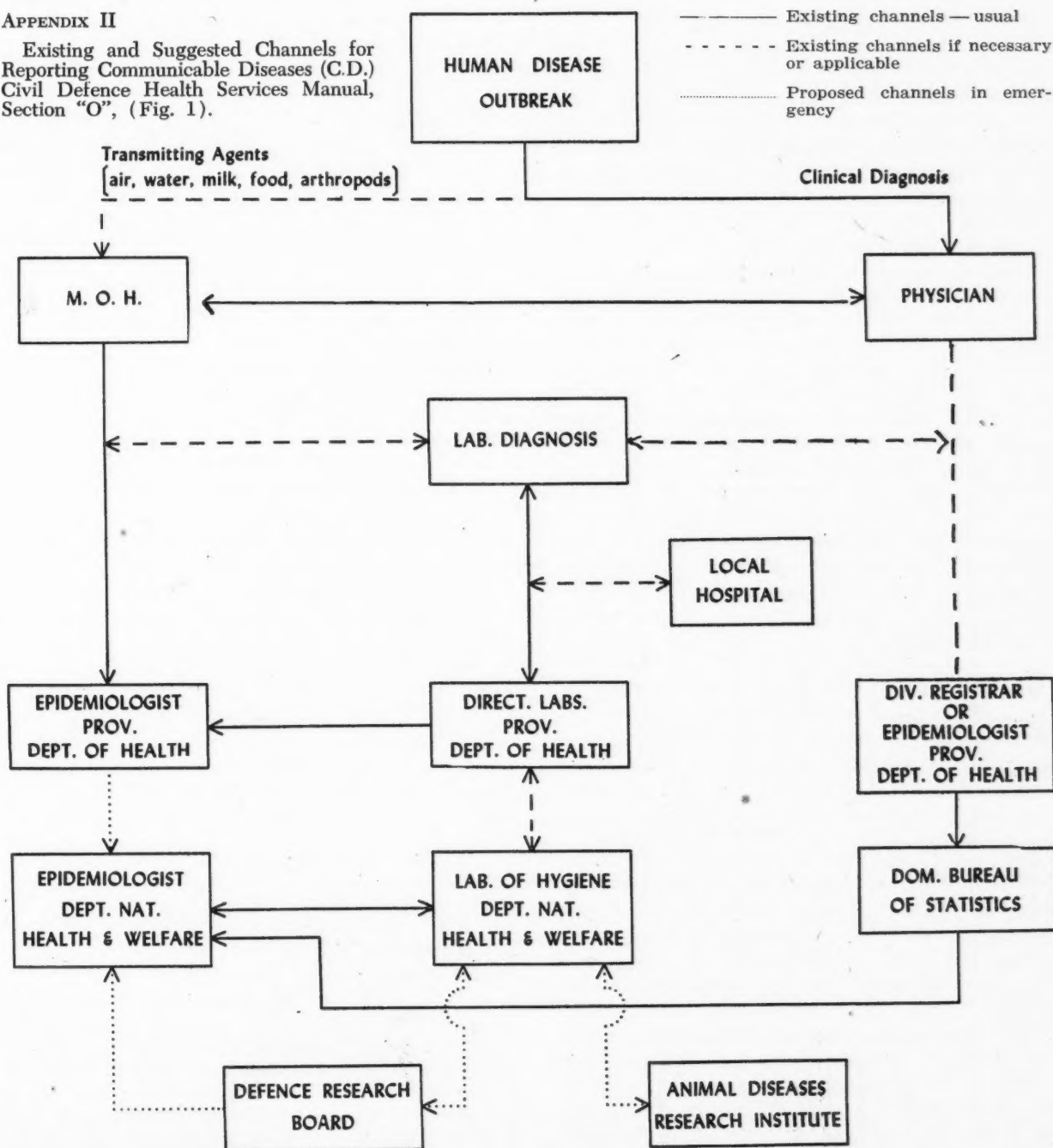
MYCOSES

Actinomyces—anaerobic
nocardii

Blastomyces
Coccidioides
Cryptococcus

APPENDIX II

Existing and Suggested Channels for Reporting Communicable Diseases (C.D.) Civil Defence Health Services Manual, Section "O", (Fig. 1).



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Managing Editor: T. C. ROUTLEY, M.D., F.R.C.P.[C.]

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Editorial Comments

THE MANAGEMENT OF THYROTOXICOSIS

A magnificent comprehensive review of this subject by Mr. Victor Riddell, of St. George's Hospital, London, England, has recently appeared in the *British Journal of Surgery* (44: 25, 1956), and many readers of this Journal may appreciate the opportunity to read a condensed version of this article.

Although the author is a surgeon, his assessment of the conflicting claims of medical and operative treatment seems quite impartial. Moreover, he is certainly on solid ground when he refers to the "artificial barrier" which "has grown up between medical and surgical methods". For best results physician and surgeon should each be completely familiar with the details and difficulties of both methods. Responsibility for the management of problem cases should be shared; if surgery is contemplated, it is of the utmost importance that the surgeon see the patient in her original untreated toxic state so that he can judge more accurately the time for and the nature of his operative intervention.

The Antithyroid Drugs

In a lengthy discussion of the antithyroid drugs the author displays his own mastery of chemotherapy in this disease. It is not always recognized that the greatest benefit of these drugs has been great improvement of the results of surgical thyroidectomy. With their assistance patients can be brought to operation in a normal physiological state so that the procedure can be carried out in a calm and careful manner. Thus the amount of gland removed is precisely controlled, injury to parathyroid and recurrent nerves is minimized, and postoperative storm eliminated.

Toxic reactions occur in about 10% of patients getting antithyroid drugs, usually within the first eight weeks of treatment. The common side-effects are fever, malaise, nausea, headache, sore throat, loss of taste, enlarged lymph nodes,

swollen joints, and rash. All are important as warning symptoms, but, provided the drug is promptly discontinued, danger exists only when granulopenia is also present. In Mr. Riddell's series of 165 patients treated with antithyroid agents 13 developed this alarming complication; apparently there were no deaths. However, figures from the literature suggest that a case-fatality rate of 14-26% may be expected when granulopenia occurs. Since granulopenia may appear some days after stopping treatment, it is recommended that the drug be stopped one week before operation and a blood count done on the day before thyroidectomy. From the experience of the author it would appear that propyl and methyl thiouracil are about equally toxic while neomercazole ("tapazole") is probably somewhat less toxic and less goitrogenic. In the detection of incipient toxic effects, routine blood counting is not only useless but dangerous, since a normal result one day may be followed next day by dangerous leukopenia. The clinical method of control is much safer, the patient being given written instructions to report immediately prodromal symptoms such as headache, malaise, prostration, chills, fatigue, or sore throat. If such patients are found to have a normal leukocyte count, it is usually sufficient to stop the drug for about 10 days and then switch to another antithyroid agent. On the other hand, when granulocytes are significantly reduced below pre-treatment level, the patient should be admitted to hospital and given penicillin, and preparations made for blood transfusions should the need arise. After the blood count has returned to normal, iodine should be administered in preparation for thyroidectomy.

The use of thiouracil in too high a dosage or for too long a period before operation may lead to the development of "thiouracil goitre", a large hyperplastic, exceedingly vascular gland on which operation is difficult and dangerous. Myxoedema may also result from excessive administration of antithyroid drugs, leading to oedema of vocal cords with increased danger of postoperative respiratory obstruction. Great care should, therefore, be taken to avoid thiouracil hypothyroidism; when it does occur, the drug must be stopped and operation postponed until normal thyroid function is restored.

Selection of Treatment

In a group of patients with hyperthyroidism, some will present a special indication for medical treatment:

1. Those with mild hyperthyroidism (sleeping pulse under 90). The majority of these can be successfully controlled by rest, sedation, and elimination of causal factors. A few only will need small doses of antithyroid drugs. Surgery and iodine are contraindicated. This is the group in which particular care must be taken to differentiate from an anxiety state.

2. Those with "masked" hyperthyroidism, i.e. no goitre and no eye signs! These are usually older patients who may complain only of weakness, dyspnoea, swelling of ankles, weight loss, amenorrhoea and/or fibrillation.

3. Young children.

4. Very old patients, or those who are poor operative risks.

5. During puberty or menopause. If the patient can be tidied over the period of physiological stress, spontaneous recovery will often ensue and thus operation be avoided.

6. Pregnancy. The author believes that most patients can be brought safely through this state without operation provided an antithyroid drug is continuously administered in the minimal dose needed to control symptoms. (B.M.R. is unreliable since it is normally raised in pregnancy!) Iodine is substituted for thiouracil during the last four weeks before delivery in order to minimize the likelihood of producing a hypothyroid baby.

7. Those with recurrent postoperative hyperthyroidism. Mr. Riddell is at pains to distinguish *true* recurrences of hyperthyroidism from *false* recurrences in which the toxic symptoms have been relieved but a pre-existing anxiety state persists.

8. Those with malignant exophthalmos. There is no evidence that thyroidectomy is any more or less likely than other forms of therapy to be followed by progressive proptosis. Nevertheless, when eye changes are already marked, it is probably wise to avoid operation on the goitre since increasing exophthalmos may bring the surgical procedure into disrepute.

9. Those who refuse operation.

In like manner it will be apparent in certain cases that *surgical treatment is particularly indicated*:

1. Those with pressure symptoms, or in whom pressure might be precipitated by use of an antithyroid drug, viz. large retrosternal or intrathoracic goitres, or those with radiological evidence of tracheal displacement or compression.

2. Toxic nodular goitre—particularly if the nodularity is unilateral, or if the goitre is already very large.

3. Failed medical treatment, i.e. cases sensitive or resistant to thiouracil or relapsing after it.

4. Suspicion of malignancy.

5. Unwilling or unco-operative patients who cannot be trusted to take drugs regularly or to attend regularly for supervision.

6. The thyrocardiac case. The author believes that the treatment of choice for thyrotoxic fibrillation in the good-risk case remains surgical after suitable preparation. In many cases with mild hyperthyroidism, preparation for operation can be satisfactorily accomplished by a short course of iodine alone. Abolition of fibrillation before operation is not essential *provided* there is no evidence of cardiac decompensation. If heart failure is established, operation can be contemplated only if this complication can be promptly and completely controlled. If not, radioactive iodine should be considered at an early phase.

Having selected those cases in which there is a special indication for either medical or surgical treatment, there still remains for consideration the largest group of all. These are, for the most part, patients with diffusely enlarged

goitres and moderate to severe hyperthyroidism. The decision whether surgical or medical (i.e. long-term antithyroid medication) treatment should be prescribed can usually be resolved by reference to four factors:

(a) The patient's age. Generally speaking, adults with moderate to severe hyperthyroidism should be treated surgically after preparation by an antithyroid drug. Children, adolescents and women during the menopause should be given the benefit of a trial of long-term medical therapy. Older patients too may safely be managed by prolonged antithyroid medication *provided* they do not have a solitary nodule or a grossly nodular gland.

(b) The patient's preference, after explanation of the advantages and disadvantages of the various methods.

(c) The facilities available. Good medical management is preferable to second-rate surgery, but the reverse is equally true!

(d) The precipitating factor. If an emotional factor is likely to be temporary or if it can be resolved in any way, conservative therapy may confidently be utilized. Similarly hyperthyroidism during puberty, pregnancy or menopause may be considered a temporary derangement which can be controlled medically until the period of physiological stress is over.

Definitive Treatment

In regard to the specific details of treatment Mr. Riddell has many interesting and important things to say. Of course he emphasizes the general measures of rest, relaxation, sedation, high-caloric diet, and extra vitamins.

The preparation of those to be treated surgically is as important as the skill of the operator. Patients with moderate hyperthyroidism (sleeping pulse 90-110) can, with few exceptions, be brought to a safe operative level with *iodine alone*. The form of iodine and dosage are of little importance; Lugol's solution, minims x, t.i.d., in milk is convenient and effective. Most patients are ready for operation in 10 days; a few require slightly longer before obtaining maximum benefit. If operation is unduly postponed the gland will become very hard, and control of hyperthyroidism may be lost. In the opinion of the author prolonged administration of iodine *after* operation is of no value in preventing recurrent thyrotoxicosis.

Antithyroid drugs *must* be used in the preparation for operation of patients with severe hyperthyroidism (sleeping pulse 110 plus). The medication should be given for the minimum time needed to render the patient euthyroid; a longer course will tend to cause excessive vascularity and may produce hypothyroidism with its attendant risks. Four weeks is sufficient in most cases; occasionally two or three weeks are all that is required. The antithyroid drug is then stopped and iodine given for its de-vascularizing effect during the last 10 days before operation. Patients prepared out of hospital must be admitted at least three days before operation.

After thyroidectomy it is wise to avoid an early return to full responsibility; this is the time to advise, when possible, a holiday.

For those to be given a trial of long-term antithyroid therapy a simple dosage scheme is suggested:

	<i>Propylthiouracil</i>	<i>Neomercazole</i>
Initial dose.....	100 mg. b.i.d.	20 mg. b.i.d.
When symptom-free.....	50 " "	10 " "
One month later.....	25 " "	5 " "
Two months later (maintenance dose)....	25 " daily	5 " daily

The dose for methylthiouracil is approximately double that for the propyl compound. The exact dosage must, of course, be adjusted to the individual case.

The occasional case of antithyroid resistance will be detected within two months; if no response is obtained by this time the method should be abandoned. These patients may then be prepared with iodine for surgery, or referred for isotope therapy. During the early phases of medical therapy weekly office visits are necessary to check progress and detect toxic effects; during the period of maintenance dosage monthly attendance is sufficient. Therapy must be continued for at least 12 months, since shorter courses are followed by a high relapse rate. Most relapses occur within two to four months after stopping medication. As a general rule such cases should then be referred for surgery or radioactive iodine.

Radioactive Iodine

Mr. Riddell admits that "the effectiveness of radioactive iodine in the treatment of thyrotoxicosis is no longer in question". The question of delayed ill effects of radiation remains unsettled. Thyroid carcinogenesis in rats given I^{131} has been demonstrated. In man a probable latent period of 20 years is to be expected. The possibility of gene mutations in germ plasma must be considered although it would appear that the dose of radiation received by the gonads is much less than that suffered during common forms of roentgenological investigation. It is felt that isotope therapy should not be utilized below the age of 45 years unless life expectancy is less than 20 years or unless other methods of treatment are contraindicated.

The estimation of dosage for I^{131} is largely empirical. When too little is given, subsequent doses at intervals of two months will be necessary. High dosage may produce permanent myxoedema, which appears to occur about as frequently as after subtotal thyroidectomy. The simplicity of isotope therapy appeals to many patients. Its chief disadvantage is the slowness of response. In a few cases temporary swelling of the gland and/or exacerbation of hyper-

thyroidism several days after administration may be alarming or even dangerous.

Radioactive iodine is particularly indicated in patients resistant or sensitive to antithyroid agents, in cases of postoperative recurrent hyperthyroidism, in those who refuse operation after a failure of drug therapy, in advanced thyrocardiacs, and in those with severe or progressive exophthalmos. It is, of course, absolutely contraindicated during pregnancy.

The Operation

The author takes a rather novel position in regard to the objectives of operation. He does not think extremely radical thyroidectomy is justified, because it is so often followed by permanent hypothyroidism requiring indefinite substitution therapy. In his opinion, provided the four named arteries to the gland are ligated, it is sufficient to remove the isthmus, pyramidal lobe and about five-sixths of each lateral lobe. In a few cases recurrent hyperthyroidism may result but this is easily controlled by radioiodine. Besides greatly reducing the incidence of postoperative myxoedema, a more conservative operation diminishes the likelihood of removal or damage of parathyroid and of picking up the recurrent nerve while suturing the cut surface of the gland.

For "toxic adenoma" hemithyroidectomy is the procedure of choice *provided* the opposite lobe appears normal at operation.

In all cases the superior thyroid vessels should be tied and divided. The inferior thyroid arteries should be tied in continuity; only when initial thyrotoxicosis has been severe do they require division. Strap muscles should be divided whenever necessary to give adequate exposure. Drains should be used in most cases and brought out of the extremities of the wound to avoid central fixation of the scar.

In the author's series of 250 cases of hyperthyroidism treated surgically there were two operative deaths (0.8%), three instances only of transient tetany (1.4%), five of toxic recurrence (2.0%), and eight cases of myxoedema (3.2%).

Comment

Mr. Riddell has presented a reasonably fair appraisal of the role of surgery, antithyroid drugs, and radioactive iodine in the treatment of thyrotoxicosis. There are certain small groups of cases particularly suited to each mode of therapy, and many more in which a choice of treatment may be made according to the patient's preference or the doctor's whim. Surgical management when expertly accomplished remains an excellent method of treatment. If the lingering fears about isotope therapy prove to be unfounded, its use will undoubtedly increase greatly.

R. A. MUSTARD

LEGAL RESEARCH IN CANADA

In our last issue we discussed certain problems of medical research and their support. It is interesting to observe that our colleagues in the legal profession are currently wrestling with similar problems. In 1954 the Canadian Bar Association set up a special committee to look into the condition of legal research in Canada and to report upon its present state and recommend steps for its improvement. This report, published in the *Canadian Bar Review* for November 1956, will interest those concerned with the organization of medical research, for there are now very close ties between the two professions and there is common ground to be covered.

At the outset, the committee states categorically that legal research in Canada today is wholly inadequate in quantity and quality to enable the legal profession properly to fulfil its high social obligations. It points to the need for research in all phases of civilized community life. Since research is constantly modifying our knowledge of the physical and biological sciences, of the social sciences and of business and governmental methods, and since the law is responsive to every new human activity and embraces the whole of society, it is clear that the legal profession cannot remain passive in this field.

The committee points to the ease with which the medical profession attracts to itself grants from all sources for research into disease and asks whether the health of the individual body is of more concern than the health of the body politic. "From what quarter does disaster seem most likely to come, a world-wide pestilence or a world-wide war? Without claiming for law a place higher than that which it should hold in a democratic society, we but state the obvious when we say that without a well-functioning legal order there can be no civilized living. A nation may have the best health services, with all the latest medical techniques and still be a dictatorship in which the individual has no rights." There is no denying the validity of this argument, and it is also clear that the legal and medical professions have many problems which can be solved only by joint action. Such are problems concerning the legal liability of medical personnel, birth and death certification, the legal position of the doctor in industry and public health, sexual offences, alcoholism, the deterrent and reforming effects of punishment, and the thousand and one other knotty problems of social psychiatry.

There is also of course need for research into established legal doctrine. Established methods of punishment of offenders need constantly to be questioned by statistical and other means and examined as to their consequences. Like the medical curriculum, the legal curriculum undoubtedly benefits from careful and unbiased study.

At first sight, the experimental techniques of the scientist might seem hardly applicable to the law, but the committee point out that every new law is a social experiment whose success can be measured in some degree as the years go by. Here the province or the nation is the laboratory, and the study of effects of operation of a law is a scientific process.

It has constantly been emphasized in medicine that research depends upon the man and not on money or buildings; encouragement of the man depends upon the formation of a climate of opinion favourable to research activities, and beginning in the university. Our friends the lawyers are thinking along parallel lines, for they state that the first requisite for better legal research in Canada is better law schools, in the sense that the young men and women entering the schools should learn the habit and techniques of research and acquire a respect for legal scholarship. Members of the medical profession, individually and through their professional associations, have by their interest and enthusiasm secured generous support for medical research centres in Canadian universities; the lawyers and their organizations must do likewise.

In our last issue we mentioned that most countries had found it necessary to set up some central institution for the organization of medical research. One of the principal recommendations of the Canadian Bar Association's committee is for the establishment of a legal research foundation, co-operating with law schools, law societies and other organizations. The committee wisely state, however, that this body cannot be a substitute for law schools, but only a complement to them.

This is an encouraging report. Let us hope that the implementation of its recommendations will not be too long delayed, for there are many problems only susceptible of satisfactory investigation by the co-operation of our two learned professions, medicine and the law.

OVERCROWDING IN MENTAL HOSPITALS

Recent articles^{1, 2, 3} in the *Lancet* draw attention to the overcrowding in U.K. mental hospitals, with recommendations to relieve the pressures on these hospitals.

Dr. Alexander Watt¹ submits evidence to indicate that outpatient clinics can and do reduce the admissions to mental hospitals. Dr. Duncan Macmillan² describes an integrated mental health service in operation in Nottingham, in which the hospital and municipal services work closely together in one over-all

scheme. He finds that there are better opportunities for dealing with the patient in the early stages of his illness when preventive measures, both social and medical, can still be effective. The psychiatrists function largely in an advisory capacity, so that more patients can be treated in the community without recourse to hospital admission.

It is encouraging to learn that, in some settings at least, such measures have apparently relieved the pressure on mental hospitals. In most parts of Canada the problem does not seem so readily resolved. It is probably true that we do not have examples of as closely integrated mental hospital-community organizations as Nottingham, but we have had in the past decade a substantial increase in outpatient and community clinics, mental health services to schools and industry, increased numbers of physicians in private practice in psychiatry and more psychiatric units in general hospitals. The university departments of psychiatry have been training psychiatrists, psychiatric nurses, psychiatric social workers and psychologists to work in the community as well as in the mental hospitals. In addition, teachers have been given experience in emotional health problems and a program of dissemination of mental health principles to the general public has been active. Nevertheless, the pressure on mental hospitals continues.

Although the admission rate to mental hospitals may not have decreased, workers who are actively engaged in the community side of psychiatry are impressed in their day-to-day work by the many patients who are aided by such facilities to carry on in the community with improvement of health, who in former years would have required admission to hospital.

There are probably numerous reasons why these measures have not cut down admissions to mental hospitals. Among these, the following may be of major importance:

(a) The population in many areas of Canada has increased very rapidly since World War II, partly due to a rise in immigration. It has been difficult to increase the number of hospital beds in proportion.

(b) With increasing awareness on the part of physicians, employers, teachers, legal authorities and the general public of the role of emotional factors in health and illness, more patients are being referred for psychiatric help and perhaps more are consequently considered in need of mental hospital treatment than formerly.

(c) The public is less averse to treatment in mental hospitals; in fact, it would appear that many no longer wish to tolerate the emotionally ill, especially the aged patient. The selective increase of the urban population, living in cramped quarters in cities, undoubtedly adds to this last factor.

(d) Whether the incidence of mental illness is actually rising is difficult to assess, although some psychiatrists are under the impression that it is.

The findings reported by Dr. Watt and Dr. Macmillan should encourage psychiatrists on the Canadian scene to continue their efforts at increasing and integrating outpatient and other community facilities. There is, however, the need to continue and increase the development of other measures that may lead to diminished load on mental hospitals. For example, it has been suspected for some time that adequate medical staff in mental hospitals increases the discharge rate. This impression would seem to be supported by the results that accompanied the allotment of additional medical staff to three large mental hospitals in Ontario for a period of one year. At the end of the year each institution had fewer patients in hospital than it had at the beginning of the year.

The greatest hope for any marked decrease is dependent ultimately on basic research that could lead eventually to more effective methods in prevention and treatment of mental illness.

JOHN G. DEWAN, M.D.,

Outpatient Department,
Toronto Psychiatric Hospital,
University of Toronto.

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PNEUMOCONIOSIS IN IRON AND STEEL FOUNDRY WORKERS

Despite the fact that iron and its alloys are used more widely than any other metal, relatively little enquiry has been undertaken to determine the exact nature of the pulmonary lesions which develop in workers in iron and steel foundries. This apparent dearth of information stems from the fact that much of the recorded investigation of these workers has been based in the main on chest x-ray surveys. An accurate appraisal of this pneumoconiosis cannot be made solely on radiological evidence but should include histological and chemical examination of the lungs together with clinical and environmental studies.

A detailed study of autopsies on eighty-five English foundry workers, in whom pneumoconiosis was suspected, has been recorded by McLaughlin and Harding.¹ The findings are compared with a similar study by the same authors of 64 cases published six years previously.² It was found that every occupation in the foundry was capable of producing a dust fibrosis of the lung but that the risk was greatest

in those employed in cleaning the rough castings. This process of fettling or dressing consists of removing sand from the mould and core adhering to the casting. Since the dust thus produced is heavily charged with freshly fractured sand particles there arises a potential hazard of silicosis. Post-mortem findings substantiate this assertion, and the commonest pulmonary lesions detected were silicosis and mixed dust fibrosis. Superimposed tuberculous infection was frequently observed, as is usual in silicosis developing in other trades. Other conditions noted included pneumonia, bronchiectasis, carcinoma of the bronchus, cor pulmonale and coronary thrombosis.

Evidence is adduced that in less than one-half of the cases was pneumoconiosis a direct cause of death and only in one-fifth was it a contributory factor. The authors are of the opinion that the radiographic changes in the lung fields of foundry workers are those of silicosis and mixed dust fibrosis and not solely siderosis, produced by the inhalation of iron oxide particles. The deaths amongst sand and shot blasters appear to be decreasing in numbers, due in part to more efficient dust control and also to the use of steel shot as a scouring agent in preference to sand.

The importance of measures designed to prevent the inhalation of potentially hazardous particles cannot be too strongly stressed. With the rapid increase in the Canadian population and the concomitant growth of the nation's industrial capacity, the problem of dust control in basic industrial processes must continue to receive the attention of those concerned with our industrial health programs.

J. D. MEDHURST

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CHANGING ASPECTS OF MELANCHOLIA

Diseases change their features for a number of reasons: therapeutic progress, immunological processes, and social, economic and cultural influences. Older medical men at the present time have observed changes influencing clinical pathology perhaps to a much greater extent than for centuries. These changes are particularly obvious in psychiatric disorders, which are more liable to be influenced by any change in the structure of our society. While statistics show an increase in admissions of cases of depressive psychoses to mental hospitals throughout the world, the clinical picture of these psychoses appears to be different from what it

used to be and in many instances the diagnosis presents more difficulties.

Doctor Hans Hoff, professor of neuropsychiatry in the University of Vienna, has analyzed the differences between the clinical picture of melancholia as seen nowadays and the one described in the classical textbooks of psychiatry and which psychiatrists remember having observed years ago. Professor Hoff¹ combines the keen psychiatric observation of the classical Vienna school with his psychodynamic approach towards psychiatric problems. The classical syndrome of melancholia consisted of primary sadness, anxiety, inhibition, absolute pessimism, lack of insight, self-reproach, aggression directed inwards and organic symptoms and signs. Of these symptoms, the anxiety and suicidal tendencies and the organic signs have not changed. However, the apparently unmotivated sadness has become rare, in most instances the mechanism of rationalization taking over. Self-reproach has become less obvious; nowadays it is usually referred to more real bases. Inhibition, one of the leading signs in the classical syndrome, is now observed only when decisions have to be made; the lack of motor inhibition adds to the danger of suicide. A pessimistic attitude is less obvious. While the dysphoric syndromes in childhood and in involutional states are more frequent, manic-depressive and schizo-affective syndromes have not noticeably changed. Generally speaking, melancholia in our time is less clear-cut and more adapted to life. As regards pathological factors involved in melancholia (heredity, psychodynamics, life crises and precipitating factors), it is well known that life crises are sharper nowadays. Many young people feel disappointed and believe that they are not understood, while old people have the feeling of being a burden to their children or to society. They do not feel secure enough and are ashamed of being old and incapacitated. Many people have lost their homes, and the haste of our time makes cities into psychological deserts in which the individual is left by himself to face the dangers of life.

Isolated reports from other countries seem to show similar changes in the clinical aspects of melancholia. Immigration countries apparently face the problem of depressive reactions in newcomers more frequently. In these cases the language barrier in addition to the difficulties encountered in social and professional life is important in changing the nosological picture. All factors involved should be borne in mind in assessing the severity, prognosis and management of depressions. M.T.

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TO ALL OUR READERS

No doubt you will already have heard that a new surgical journal, the *Canadian Journal of Surgery*, is to appear in 1957, and will wish to know something about it. Your first question will naturally be . . . who is to be responsible for the quality of its contents? The answer is, in the first place, an editorial board consisting of the professors of surgery in all the medical faculties across Canada, with Dr. R. M. Janes, professor of surgery in the University of Toronto, as chairman of the board, and an advisory board in such subjects as gynæcology, urology, plastic surgery, etc. Secondly, quality of presentation will be assured by the publishers, the Canadian Medical Association, and in particular the editorial staff of the Association. Thirdly, and this is the most important point, high quality will be assured by the surgeons of Canada using this new journal as a medium for communication of original work to their colleagues.

Feeling certain that there is now a need for a Canadian surgical journal, the Canadian Medical Association has allocated a substantial sum of money to launch the new publication. Its continuing financial stability can only be guaranteed, however, by the willingness of all those interested in any branch of surgery to subscribe to the journal.

It should be remembered that the *Canadian Journal of Surgery*, which will appear quarterly from October 1, 1957, will contain material of interest to men in all fields of surgery including ophthalmology, otolaryngology and anaesthesia, as well as to the general practitioner whose work includes surgery. We are therefore asking you to subscribe to the first volume (four issues) of the *Canadian Journal of Surgery*, at a subscription rate of ten dollars, a figure subject to modification later in the light of experience.

R. M. JANES, Chairman of Board,
S. S. B. GILDER, Editor, C.M.A. publications,
T. C. ROUTLEY, Managing Editor, C.M.A. publications.

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Medical News in brief

A TRANQUILLIZER FOR GENERAL PRACTICE

Coirault and his colleagues from the Val-de-Grâce Hospital, Paris, France (*Presse méd.*, 64: 2239, 1956), are impressed with the results obtained by administration of a new tranquillizer, hydroxyzine (Atarax), in milder neuropsychiatric cases. They used the drug in three forms, 25 mg. tablets, a syrup containing 400 mg. in 200 c.c., and injectable ampoules of 100 mg. Its pharmacological action appeared to differ from that of chlorpromazine and reserpine; injections rapidly controlled hypomanic attacks; in depressive states it diminished anxiety without having a euphoric effect; in anxiety neuroses the results were inconstant. In two cases painful radicular syndromes were relieved. In severe delirium, up to 500-600 mg. was given as a single dose without the slightest ill effect. The patients did not become somnolent. The authors are now trying out hydroxyzine to control tremor in Parkinsonism and to use in the interval between epileptic fits.

The best results were obtained on outpatients, and in particular the authors consider this a drug of choice in anxiety states accompanied by somatic manifestations, such as palpitations, dyspnoea, or precordial pain, which usually yield to a dose of 6-9 tablets a day. Good results were obtained in character disturbances in children, and in emotional disturbances in older subjects. Motor agitation is rapidly calmed. The drug has a favourable action as an anti-emetic and in intractable hiccup. It should be tested in motion sickness. The very high therapeutic index leads the authors to advise use of this drug in general practice in cases which would seem only to require simple management.

TREATMENT OF TETANUS

Tetanus is apparently a common disease in Brazil; in the state of Sao Paulo this disease is responsible for over half the deaths from specific infantile diseases and kills more infants than whooping-cough, diphtheria, measles, chickenpox and polio together. With this wealth of material, the hospital of the University of Sao Paulo has studied various treatments for tetanus during the past five years. It is claimed by Veronesi (*Am. J. M. Sc.*, 232: 629, 1956) that as a result of this study tetanus mortality in his hospital has been reduced to the lowest figure ever reported. The regimen now employed consists of continuous intravenous Mephenesin, supplementary sedation with barbiturates or chloral hydrate, antibiotics, intravenous feeding, and small doses of 100,000 units tetanus antitoxin administered by specially trained nurses. This regimen has been used since 1952 and the mortality rate in the last 236 consecutive cases has fallen to 18.2%. The author condemns drug-induced hibernation. Apnoeic crises must be constantly watched for and treated immediately by injecting intravenously 20-50 c.c. of a 2% solution of Mephenesin.

A VACCINE FOR ACUTE RESPIRATORY ILLNESS

Interesting studies on the prevention of respiratory disease in military personnel are reported from the Walter Reed Army Institute of Research, Washington, D.C. (*J. A. M. A.*, 163: 4, 1957). The first of the two reports records the preparation of a formalin-killed adenovirus vaccine of monkey kidney origin, containing strains of types 4 and 7 adenovirus, for protection against epidemic acute respiratory illness. An impressive field trial of the vaccine was given to a test group of 311 infantry recruits, whose subsequent record was compared with that of a control group of 313 men given injections of a placebo. No untoward reactions were observed, and the effect of the vaccine became manifest within a week after the first injection. In the period from the second to fifth weeks inclusive, there was only one case of serologically positive adenovirus disease requiring admission to hospital in the vaccinated group, as compared with 61 cases in the control group. There is also some serological evidence of reduction of mild and inapparent infections by vaccination. No evidence is yet available about the duration of protection. The vaccine has apparently considerable value for military populations; its role in civil life remains to be seen.

SYNTHETIC OXYTOCIN

Oxytocin (Pitocin), so far used in obstetrics to induce labour or to control the third stage of labour, has always been a purified preparation obtained from pituitary. Synthetic oxytocin is now available in a preparation containing 10 i.u. per c.c., 1 i.u. corresponding to 0.02 mg. of the synthetic drug. The question arises whether there is any difference in obstetric action or in cardiovascular action between the synthetic and the natural products. This was investigated by Mayes and Sherman of Sydney, Australia (*J. Obst. & Gynec. Brit. Emp.*, 63: 812, 1956). The effects of the new drug were studied on the cardiovascular system of six individuals. It was then used for induction of labour in 59 cases and for management of the third stage in 25 cases. The effects of doses of two or more units intravenously were almost identical with those previously described for Pitocin. These consist of a fall in blood pressure and depression or even inversion of T waves in the ECG. In clinical use it was impossible to distinguish between the behaviour of the synthetic and natural products. For induction of labour, intravenous administration of 5 units in a dilution of 500 c.c. appears to be safe, *provided that continuous supervision is possible*. It is more likely to induce labour than is an intramuscular injection. Where however staff is inadequate, intramuscular injection is safer. For the third stage of labour, oxytocin should not be used intravenously, for the cardiovascular effects observed are ill-understood and capricious.

(Continued on advertising page 51).

GENERAL PRACTICE

SIR JAMES MACKENZIE



ON NOVEMBER 17, 1956, Dr. Ian D. Grant of Glasgow delivered the third James Mackenzie Lecture before the College of General Practitioners of the United Kingdom. This lecture, reprinted in the *Practitioner* for January 1957, is of great interest to general practitioners, not only for the light it throws upon the character of Sir James Mackenzie himself, but also for showing to what heights the general practitioner can rise. When Mackenzie graduated in 1878, after a term as house physician in Edinburgh Royal Infirmary, he wrote to a friend that in spite of his longing to do research, his very moderate attainments precluded him from obtaining a university post, and he recognized that he was "only suited for what is considered to be the lowest sphere in the medical profession". He then went on by his precept and example to prove that general practice is the one place in which the early signs of disease can be thoroughly and effectively studied. In the drab grey town of Burnley in Lancashire, Mackenzie lived and worked for 25 years, combining a very busy general practice with intensive study of the symptomatology and treatment of heart disease. After 20 years of study, he published his first book, "The Study of the Pulse", which brought him fame and recognition in Germany and America, but not in lordly London, where it was not believed that a general practitioner could produce anything new in cardiology. The United States, Canada and the continent recognized his worth, but the men of Harley Street remained unimpressed, until at the age of 54 he went to London to impose his views on a doubting and reluctant profession. Soon after this, the publication of his book "Diseases of the Heart" produced a complete volte-face in London, where the new teacher was loaded with honours.

However, at the age of 65 the man who was now hailed as the greatest cardiologist of all time decided that he would leave his consulting rooms in Harley Street and return to general practice. His disciples in London were worshippers of the gods of the machine and the laboratory; they had never practised medicine in the homes of the people, and failed to appreciate the viewpoint of Mackenzie.

In his closing years, Mackenzie returned to Scotland and founded the Mackenzie Institute in St. Andrew's, where he hoped with the help of local general practitioners to study the earliest symptoms of disease. Unfortunately with his death in 1925 this project faded away.

Dr. Grant went on to comment on the National Health Service of the United Kingdom today, stating emphatically that the success or failure of the service must rest on the shoulders of the government, which had introduced the scheme and whose duty it was to ensure that the people of Britain enjoyed a satisfactory standard of medical care. He mentioned the feelings of frustration, disappointment, and even despondency which are to be found in the medical profession of Great Britain, and particularly in the younger men. He pointed out that few of their colleagues in the dominions or in the United States would accept the conditions under which British practitioners worked today. Unity in the profession was essential, and there should be a two-way traffic between general practice and specialism. The next decade would show whether the British general practitioner was to remain a true practitioner of the art and science of medicine, or whether he would be downgraded to the role of disposal agent for the nearest hospital.

Dr. Grant called for the removal of the National Health Service from the sphere of party politics, and for the maintenance of some private practice, not as a rival to the N.H.S., but as a friendly competitor with it.

MISCELLANY

THE RESPONSIBILITIES OF THE
MEDICAL PROFESSION IN THE USE
OF X-RAYS AND OTHER IONIZING
RADIATION*

1. The United Nations General Assembly, being aware of the problems in public health that are created by the development of atomic energy, established a Scientific Committee on the Effects of Atomic Radiation. This Committee has considered that one of its most urgent tasks was to collect as much information as possible on the amount of radiation to which man is exposed today, and on the effects of this radiation. Since it has become evident that radiation due to diagnostic radiology and to radiotherapy constitutes a substantial proportion of the total radiation received by the human race, the Committee considers it desirable to draw attention to information that has been obtained on this subject.

2. Modern medicine has contributed to the control of many diseases and has substantially prolonged the span of human life. These results have depended in part on the use of radiation in the detection, diagnosis and treatment of disease. There are, however, few examples of scientific progress that are not attended by some disadvantages, however slight. It is desirable therefore to review objectively the possible present or future consequences of increased irradiation of

*Statement by the United Nations Scientific Committee on the Effects of Atomic Radiation.

populations which result from these medical applications of radiation.

3. It is now accepted that the irradiation of human beings, and particularly of their germinal tissues, has certain undesirable effects. While many of the somatic effects of radiation may be reversible, germinal irradiation normally has an irreversible and therefore cumulative effect. Any irradiation of the germinal tissues, however slight, thus involves genetic damage which may be small but is nevertheless real. For somatic effects there may however be thresholds for any irreversible effects, although if so these thresholds may well be low.

4. The information so far available indicates that the human race is subjected to natural radiation,* as well as to artificial radiation due to its medical applications, to atomic industry and its effluents and to the radioactive fallout from nuclear explosions. The Committee is aware of the potential hazards that such radiation involves, and it is collecting and examining information on these subjects.

5. The amount of radiation received by the population for medical purposes is now, in certain countries, the main source of artificial radiation and is probably about equal to that from all natural sources. Moreover, since it is given on medical advice, the medical profession exercises responsibility in its use.

6. The Committee appreciates fully the importance and value of the correct medical use of radiation, both in the diagnosis of a large number of conditions, in the treatment of many such diseases as cancer, in the early mass detection of conditions such as pulmonary tuberculosis, and in the extension of medical knowledge.

7. Moreover, it appreciates fully the contribution of the radiological profession, through the International Commission on Radiological Protection,† in recommending maximum permissible levels of irradiation. As regards those whose occupation exposes them to radiation, the establishment of these levels depends on the view that there are doses which, according to present knowledge, do not cause any appreciable body injury in the irradiated individual; and also on the consideration that the number of people concerned is sufficiently small for the genetic repercussions upon the population as a whole to be slight. Whenever exposure of the whole population is involved, however, it is considered prudent to limit the dose of radiation received by germinal tissue from all artificial sources to an amount of the order of that received from the natural background radiation.

8. It appears most important therefore that medical irradiations of any form should be restricted to those which are of value and importance, either in investigation or in treatment, so that the irradiation of the population may be minimized without any impairment of the efficient medical use of radiation.

9. The Committee is consequently anxious to receive information through appropriate governmental channels as to the methods and the extent by which such

economy in the medical use of radiation can be achieved, both by avoiding examinations which are not clearly indicated and by decreasing the exposure to radiation during examinations, particularly if the gonads, or the fetus during pregnancy lie in the direct beam of radiation. It seeks, in particular, to obtain information as to the reduction in radiation of the population which might be achieved by improvements in instrument design, by fuller training of personnel, by local shielding of the gonads, by choosing appropriately between radiography and fluoroscopy, and by better administrative arrangements to avoid any necessary repetition of identical examinations.

10. The Committee also seeks the co-operation of the medical profession to make possible an estimate of the total radiation received by the germinal tissue of the population before and during the child-bearing age. It considers it to be essential that standardized methods of measurement, of types at present available, should be widely used to obtain this information and it emphasizes the value of adequate records, maintained by those using radiation medically, by the dental profession, and by the responsible organizations in allowing such radiation exposure to be evaluated. The Committee is convinced that information of this type will make it possible to decrease the total medical irradiation of the population while preserving and increasing the true value of the medical uses of radiation.

MEDICAL SOCIETIES

PHARMACOLOGICAL SOCIETY OF CANADA

Those interested in pharmacology will be glad to know that the Pharmacological Society of Canada has accepted invitations to hold a spring convention of the Society at Edmonton, Alberta, on Tuesday, June 18, 1957, during the week of the 90th Annual Meeting of the C.M.A. in the same city. The Pharmacological Society was invited to hold such a convention by the Canadian Medical Association, by Dean Scott and President Stewart of the University of Alberta, and by Charles W. Nash, director of pharmacology at the University of Alberta. The convention will be held in the Medical Building of the University of Alberta on 89th Avenue, just off 112th Street in Edmonton. The convention will consist of presentation of 10-12 minute papers by charter members and their scientific associates, a business meeting and a pharmacology dinner which will be held at the Men's Residence, Athabasca Hall (near the Medical Building), on Tuesday evening. Since the charter membership of the Pharmacologist Society is not yet complete, papers may be presented by applicants for charter membership and their scientific associates. Further particulars relative to charter membership may be obtained from the Secretary-Treasurer of the Pharmacological Society of Canada, Dr. Werner Kalow, University of Toronto, Toronto. Papers relative to drug therapy and/or toxicology in man are particularly indicated for this convention. Those interested in attending should ask for and complete an attendance form obtainable from Dr. Eldon M. Boyd, Department of Pharmacology, Queen's University, Kingston, Ontario. All applications for attendance should be in his hands before April 1, 1957.

*The radiation due to natural sources has been estimated to cause between 70 and 170 millirem of irradiation to the gonads per annum in most parts of certain countries in which it has been studied, although higher values are found locally in some areas. See the reports "The hazards to man of nuclear and allied radiations" published by the United Kingdom Medical Research Council in June 1956, in which also the millirem is defined; and from information submitted to the Committee.

†See the report of the International Commission on Radiological Protection (published in the *British Journal of Radiology*—Supp. 6, of December 1954—in the *Journal français d'électro-radiologie*—No. 10, of October 1955—etc. and revised in 1956).

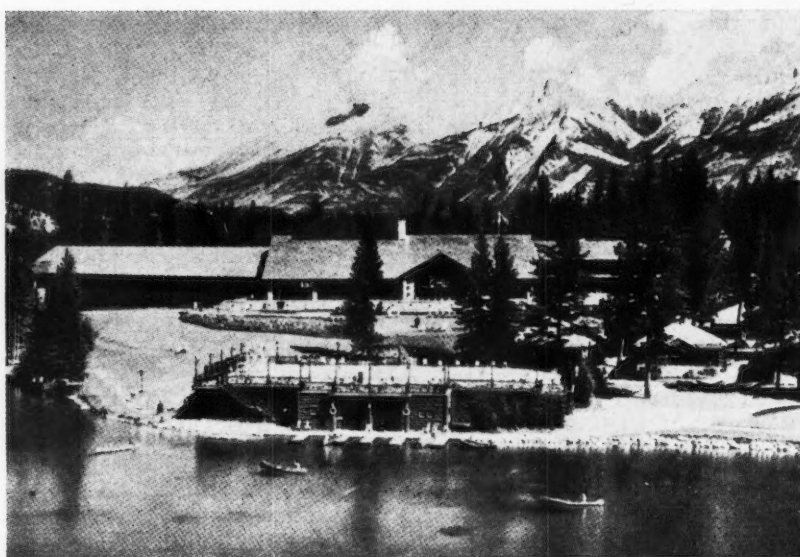
JASPER, BANFF AND LAKE LOUISE

From the Annual Meeting in Edmonton you can, in little more than half a day by motor car or the main line of the Canadian National Railways, reach one of the most beautiful spots on the North American continent—Jasper National Park. Jasper, the largest (4200 square miles) of Canada's national parks, is 235 miles west of Edmonton, on a good road. Here, towering snowcapped peaks soar far into the clouds, white streams rush through alpine valleys, and the entire region is dotted with gem-like lakes. In this setting of mountains and green forest you may explore from car or saddle, hike, climb or fish, swim and go canoeing, play tennis, or enjoy a game of golf on the championship course at Jasper Park Lodge. In and around Jasper there is good fishing, easily got at, and many trips occupying a day or two can be planned. The accommodation is excellent. There are several hotels in Jasper itself, and quite a number of good bungalow and cabin camps are scattered throughout the Park, most of them close to the town. Three miles from the town is the famous Canadian National Railways hotel, Jasper Park Lodge.

All-expense tours of from one to four days at the Lodge have been planned so that visitors may cover the most ground in the least possible time and at the least expense. They include a selection of the most popular sightseeing drives, and the costs are based on the minimum rates for hotel room and meals. Full information about these tours is available from your local C.N.R. representative or travel agency.

One of the most fascinating sections of the Canadian Rockies is the Maligne area, to the southeast of Jasper. Maligne Lake, the largest glacial lake in the Rockies—a mile above sea level and surrounded by ice-crowned mountain peaks towering another mile into the sky—is one of the great scenic wonders of North America. It is 17 miles long, with 50 miles of shoreline, and most of the mountains in the ranges that border it reach an altitude of more than 10,000 feet. The lake is reached by motor car and motor boat. One-day trips, overnight trips, and two-night visits are made from Jasper Park Lodge.

A few miles from the Lodge, on the lower Maligne River, is the Government Fish Hatchery that breeds the trout with which the mountain waters are stocked. Maligne Lake and River, and other innumerable lakes and brooks, are well provided with rainbow, Dolly Varden, lake,



Canadian National Railways

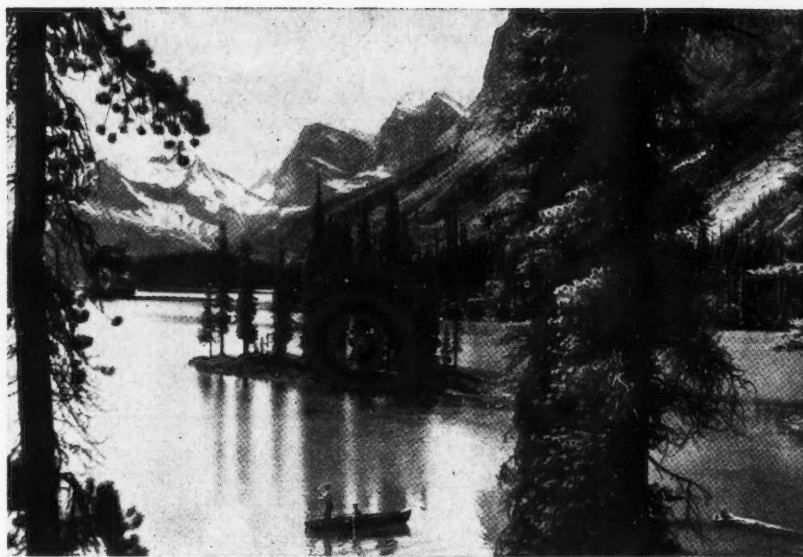
Jasper Park Lodge

speckled, and eastern brook trout. It is easy to get to the fishing places, and sometimes you have the added pleasure of a short camping trip by horseback. Boats and guides are available at reasonable rates.

Unquestionably one of the scenic wonders of the western world is the Columbia Icefield. Covering more than 110 square miles, it is the largest body of ice outside the Arctic Circle; its loftiest summits tower 11,000 and 12,000 feet above sea level. A 75-mile motor trip to the Icefield is available from Jasper Park Lodge to the chalet at the foot of the great Athabaska Glacier.

* * *

As the C.M.A.'s 1960 meeting will be held in Banff, most of the members attending the 1957 meeting in Edmonton will probably want to divide their limited time between that city and conveniently located Jasper, leaving the exploration of Banff and the rest of southwestern Alberta until 1960. For those who cannot wait, let us say simply that Banff is a delightful mountain resort with all the comforts, recreational facilities and amenities of life that one could wish for. The town is also the gateway to Canada's oldest national park, established in 1887 and covering 2564 square miles of mountain, valley, forest, lake and stream. A large number of beauty spots and points of interest in the vicinity of the town attract thousands of visitors every season—the Sulphur Hot Springs, the Buffalo Park, John's Canyon, Lake Louise, the Great Divide, Morain Lake, and Yoho Park. The chief hotel is of course the internationally famous Banff Springs Hotel, operated by Canadian Pacific Railways, but there are a number of other hotels in the town and its vicinity.



Canadian National Railways

Maligne Lake in the Canadian Rockies

A trip from Banff to Lake Louise, by car or bus, covers 40 miles of the most exciting scenic highway on this continent. Lake Louise itself is one of the magnificent sights of the Canadian Rockies—a small, quiet lake of brilliant emerald green set against a background of towering peaks and encircled by great glaciers. The C.P.R.'s Château Lake Louise, built close to the water's edge amid green lawns and colourful gardens, is an integral part of the scene. Forming a constellation of peaks about the lake are five mountains ranging in height from 9000 to 11,300 feet; and above the lake are the Lakes of the Clouds, Lake Mirror and Lake Agnes, accessible from Lake Louise by a wide trail which zig-zags two and a half miles, a climb of 1200 feet up the mountainside.

* * *

THE CIRCLE TOUR

One of the best ways to see a cross-section of Alberta is to take what is known as the Circle Tour—from Edmonton to Jasper, to Lake Louise, Banff and Calgary, and back to Edmonton; or from Edmonton through Red Deer to Calgary and thence to Banff, Lake Louise and Jasper. This will show you Alberta's leading cities, the ranch country, the oilfields, and the beauty of the Canadian Rockies. All main highways in Alberta are paved, and new surfacing is almost complete from Edmonton to Jasper. Illustrated literature about the Circle Tour is available from the Alberta Travel Bureau, Legislative Building, Edmonton. If you are travelling by car, convenient accommodation along the way is provided by cabins, chalets, lodges, and grounds equipped for camping. There are good gravelled secondary roads in the mountains. The Circle Tour may of course also be made by bus.

A wide variety of all-expense motor tours is available from Edmonton, Jasper, Banff, and Lake Louise, and you will find your local travel agent helpful in the selection of those that best fit the time and money you wish to spend. So that passengers visiting the Canadian Rockies may see both Jasper National Park and Banff National Park, the Canadian National Railways have made arrangements whereby motor transportation between Jasper and Banff and/or Lake Louise may be purchased when railway transportation is secured, thus enabling you to complete your transportation arrangements, both rail and motor, for the entire trip at the point of departure. Or the motor trip

may be incorporated in a circle tour of the principal resorts of the Canadian Rockies. Your local C.N.R. or C.P.R. representative will outline the various arrangements to you.

If you are considering the possibility of taking a trip up the Alaska Highway, the Alberta Travel Bureau or the Alberta Motor Association will tell you what you will need. Dawson Creek, 475 miles from Edmonton, is Mile Zero of the highway. From there, a 36-foot wide gravel road stretches north and west to Fairbanks (1523 miles) and to Anchorage (1603 miles). A branch-off can be made down through the highway in British Columbia, in which case, barring accidents, you will end up in Vancouver. The roads are pretty much what you would expect, but are always passable. The scenery is rugged and unusual.

**REDUCED RAILWAY FARES
FOR THE ANNUAL MEETING**

Arrangements have been made with the Canadian Passenger Association to provide reduced railway fares for members of the Association and their families proceeding to the Annual Meeting at Edmonton.

Adult round-trip fares will be available for one and one-half times the normal one-way fare, plus 25c.

Authorized dates for starting the going journey are as follows:

Western Lines (all points west of Port Arthur and Armstrong): June 10-20 inclusive.

Eastern Lines: June 8-18 inclusive.

Newfoundland: June 6-16 inclusive.

A return limit of 30 days applies to these tickets.

Identification Certificates to permit your purchase of tickets at this reduced rate may be obtained on application to the General Secretary, C.M.A., 150 St. George Street, Toronto 5, Ontario.

Association Notes

DEPENDENTS' MEDICAL CARE— U.S. ARMED FORCES IN CANADA

An enactment of the United States 84th Congress, "The Dependents' Medical Care Act" became effective December 7, 1956. Its provisions apply to dependents of the armed forces of the United States, who are living in Canada. Dependents are limited for the purposes of this act to spouse and children living actually in Canada.

Where medical facilities of the U.S. uniformed services are available, dependents will be expected to obtain necessary medical and hospital care from these facilities. Where U.S. service medical facilities are non-existent, medical and hospital care as generally outlined hereunder is authorized from local civilian sources. Civilian medical care is authorized and available only to spouse and children of sponsors (members) of the uniformed forces on active duty.

Benefits provided to eligible dependents include:

- (a) Treatment of acute medical and surgical conditions in hospital.
- (b) Complete obstetrical and maternity care whether rendered in hospital, in the physician's office, or the patient's home.
- (c) Services required of a physician prior to and following hospitalization for a bodily injury or surgical operation.
- (d) Hospitalization to a maximum of 365 days in semi-private accommodation.
- (e) Treatment in a hospital of acute emergencies.
- (f) Diagnostic pathological and radiological tests and procedures during hospitalization, prior to hospitalization (maximum \$75.00) and rendered after hospitalization (maximum \$50.00).
- (g) Dental care that is determined to be an adjunct to medical or surgical treatment rendered in hospital.

Benefits do not include:

- (a) Medical care for chronic diseases.
- (b) Care of nervous and mental disorders.
- (c) Elective medical and surgical treatment.
- (d) Domiciliary care.
- (e) Treatment and procedures normally carried out in physician's office or patient's home.
- (f) Ambulance service.
- (g) Prosthetic appliances, hearing aids and spectacles.
- (h) Routine dental care.

A dependent patient or the sponsor is responsible for the payment only of: (a) the first \$25.00 of hospital charges, or \$1.75 per hospital day, whichever sum is greater; and (b) the first \$15.00 of professional charges for physician's services as authorized in medical emergencies treated (i.e., accidents, etc.) but not hospitalized.

The payment of physicians' fees will be based on the provincial fee schedules promulgated by the Divisions of the Canadian Medical Association.

In general the service may be regarded as providing payment for the diagnosis and treatment of acute medical and surgical conditions in hospital, complete obstetrical care and the necessary hospitalization connected with these services, with deductible features.

Eligible dependents will identify themselves to physicians by a dependents' identification card appropriate to the service or by the Dependents' Authorization for Medical Care (DD Form 1173). Substitute

methods of identification may be used until July 1, 1957, when DD Form 1173 is mandatory.

Accounts from Canadian hospitals and physicians should be submitted for adjudication and appropriate action to the representative of the Armed Service sponsoring the dependent, i.e., for U.S. Army—the Military Attaché, U.S. Embassy, Ottawa; for U.S. Navy—the Naval Attaché, U.S. Embassy, Ottawa; for U.S. Air Force, except North East Air Command, to Finance Detachment No. 1, HQ Air Defence Command, 119 Ross Avenue, Ottawa; USAF, North East Air Command—Commanding Officer, Pepperrell Air Force Base, St. John's, Newfoundland.

LETTERS TO THE EDITOR

INFECTION AND THE COMMUNION CUP

To the Editor:

Dr. Bending deserves to be commended for bringing to your attention his views on infection and the communion cup as contained in his letter in the January 1 issue of your Journal.

This problem has greatly troubled many Anglicans and has been lying dormant for many years awaiting the courage and initiative of an Anglican or other informed individual to bring it to the surface. The situation is one of great danger in the transmission of communicable disease, at all times, and not only in the presence of an epidemic.

In a survey conducted by the Department of Preventive Medicine at McGill 25 years ago, it was abundantly shown that in restaurants, private homes and hotels, *B. coli* and other organisms could be recovered from eating utensils, proportionate to the degree of washing, all the way from a cursory "dip and dry" to the more elaborate washing with an automatic machine; hence the subsequent use of chlorinated water and rinse waters in hotels and restaurants which was made compulsory at about that time. Neither is the wine sufficiently antiseptic nor does the casual wiping of the rim of the cup with a napkin preclude contamination by another with any one of the whole range of pathogenic organisms. Further, it must tax the resourcefulness of the Celebrant of the Service to recover from the wine small portions of broken bread which are occasionally dropped by communicants who have been previously served.

During the early 1940's when I was directing the activities of the Industrial Hygiene Division of the Federal Department at Ottawa, an enquiry was received from a friend of mine—the Senior Medical Officer of one of the Colonies—where the religious persuasion was predominantly Anglican, requesting information regarding the transmission of communicable disease through the medium of the common cup. Although the immediate reason for the enquiry was not stated, it was apparent that either a difference of opinion existed between the learned bishop of the Diocese and the equally learned and astute medical officer or that some fairly definite evidence of disease transmission, possibly a primary sore, had been traced to its immediate origin. In discussing the matter with the then Director of Public Health Services, who was a member of the Roman Catholic communion, it was stated by him that the exact problem did not arise in his Church but that an equally important role was constantly being played by adherents of his faith, when, in their adoration, they stopped to kiss the feet of a replica of Saint or Virgin at the entrance of the church. In his own case, he pulled a handkerchief from his pocket, and

performed his obeisance through a protecting layer of linen. And so the matter ended.

The remarks of the rector of a Vancouver church that it is not considered a problem which raises any difficulty cannot be dismissed lightly.

At least one lesson in elementary public health education is thrown to the winds. There are many in every community who continue to drink unpasteurized milk and give it to their children or question the validity of chlorinated drinking water. Granted that the clergy are the most open to infection in that they consume all the consecrated wine that is left, the problem remains the greatest in the Anglican church. Those of us who are members of that church feel very deeply about the matter.

I do not feel that the Service of Holy Communion would lose any of its dignity, beauty or effectiveness through the use of individual containers.

C. F. BLACKLER, M.D., D.P.H.

108 N. Summit,
Prescott, Arizona,
January 26, 1957.

THE LONDON LETTER

(From our own correspondent)

THE DECLINE OF ACUTE RHEUMATISM

Acute rheumatism is a "disappearing disease which has changed its type", according to the recently published biennial report of the chief medical officer to the Ministry of Education for 1954 and 1955. Rheumatic fever is now rare, cases of severe rheumatic carditis are infrequent, and chorea is uncommon. In 1955, among the 6.5 million schoolchildren, aged 5 to 14 years, there were only 71 deaths from rheumatic fever or from chronic rheumatic heart disease (43 from rheumatic fever and 28 from chronic rheumatic heart disease), compared with 233 in 1950. The comparable figures for the whole population of England and Wales for rheumatic fever were 217 deaths in 1955, compared with 775 in 1946. Acute rheumatism is notifiable in only eight areas in the country; in these areas 70 cases were notified in 1955, compared with 146 in 1954. As an example of what this means in terms of hospital utilization, the case of West Wickham Hospital may be quoted. Before the last war there were 80 beds in this hospital mainly occupied by cases of rheumatic carditis. Now there are only six or even fewer cases at any one time, and these are mainly mild cases.

BREAST FEEDING

In 1955, in England and Wales the incidence of full breast feeding for babies born at home was 82.4% at two weeks old, compared with only 76.06% for babies born in institutions—at the time of discharge from the maternity unit. The incidence in undergraduate teaching hospitals in London was even lower—67.79%. The figure for babies born at home has been fairly steady over the last three years (80.14% in 1954, and 82.3% in 1953), but those for babies born in institutions have been falling steadily since 1950. In that year the incidence was 86.2% in all institutions and 85.2% in London undergraduate teaching hospitals. In commenting on these figures in his annual report for 1955 the chief medical officer to the Ministry of Health expresses disappointment at this "steady decline in the teaching hospitals. . . . These are the places where the doctors and midwives of the future receive their training and have their professional attitude conditioned. The in-

ability of such hospitals to foster breast feeding to a greater extent than they do is unlikely to impress students with its value and so to make them convinced exponents when they ultimately go into practice."

In reporting on the now accepted etiological role of certain serological type of *E. coli* in infantile gastroenteritis, it is noted that these have been found in cow's milk and in the droppings of chickens, and it is suggested that "the known preventive effect of breast feeding may be due to the fact that thereby infants are not exposed to the chance of infection through cow's milk or other foods".

SLIMMING DRUGS

Once again the council of the Pharmaceutical Society of Great Britain has had to come to the rescue of the public to save them from the harmful effects of the consumption of potentially dangerous drugs which the authorities allow to be sold without prescription to the public. This time it is the so-called "slimming drugs". In the opinion of the council "the use of drugs as an aid to slimming involves risks which, even if the drugs are not of such a nature as to require legal control, make it advisable for caution to be exercised in their supply". The council are "therefore of the opinion that pharmacists should not supply preparations marketed for this purpose, other than foods, unless they have satisfied themselves by inquiry that the preparations in question will be used on medical advice".

GENERAL PRACTICE AND THE STUDENT

The progress made in the teaching of general practice to students is admirably illustrated in a report published by the British Medical Students' Association. This shows that all but five of the 27 medical schools in the United Kingdom which offer facilities for clinical study now have general practice schemes which are either officially recognized or organized. These schemes are divided into four categories: (1) *Health Centre Schemes*, of which there are only two—in Edinburgh and in Manchester. (2) *Residential Schemes*, of which there are eight. In these the students spend some time living with the general practitioner, attending his surgeries and accompanying him on his rounds. (3) *Attachment Schemes*, of which there are 11. Here the student is attached to a general practitioner in the mornings for a given period of time, usually one to two weeks. In many cases the student extends his visits to include the evening surgeries, by arrangement with the general practitioner. (4) *Day Visit Schemes*. There is only one of these. Here the student spends a day with a general practitioner.

In most schools these courses are not compulsory but, after a slow start in some instances, most of them have been taken up enthusiastically by the students, who have quickly come to realize their importance to them after qualification.

WILLIAM A. R. THOMSON
February 1957.

CHANGE OF ADDRESS

Subscribers should notify the Canadian Medical Association of their change of address *two months* before the date on which it becomes effective, in order that they may receive the Journal without interruption. The coupon on page 85 is for your convenience.

ABSTRACTS from current literature

MEDICINE

Hæmodynamic and Clinical Appraisal of Coarctation Four to Seven Years after Resection and End-to-End Anastomosis of the Aorta.J. L. WRIGHT *et al.*: *Circulation*, 14: 806, 1956.

The circulatory dynamics of 10 patients studied before operation and at intervals during the seven years following resection of aortic coarctation and end-to-end anastomosis are reported.

In addition to dramatic immediate postoperative improvement in the degree of coarctation, measurable improvement of a lesser degree continued in succeeding years. A slight to moderate measurable degree of residual coarctation persisted in five patients.

The radial and femoral arterial pressures were within the range of normal in most patients at the time of the long-term study, and none had a severe degree of hypertension.

The cardiac output determined four to seven years after operation was within the range of normal, and the calculated peripheral arterial resistance was only slightly increased in three patients. S. J. SHANE

Effects of Cortisone on Metabolic Responses in Myocardial Infarction.G. G. BERG, R. W. BURROUGHS AND R. A. BRUCE: *Am. J. M. Sc.*, 232: 513, 1956.

Five patients with acute myocardial infarction were treated with oral cortisone, 300 mg. daily, during the first 12 days of disease. Moderate sodium and water retention occurred in two severely ill patients who died, but not in three patients who lived. Blood pressure responses and morbidity and mortality rate were not favourably influenced.

In this small group, neither morbidity nor mortality was significantly influenced by cortisone therapy. Death occurred in two patients as predicted by Pathologic Index Rating on admission. There was neither a "stabilizing effect" on blood pressure, nor prevention of hypotension. Blood pressure was lowered in three survivors; systolic pressures below 90 (and even below 80 in 1 Oriental patient) were not accompanied by shock. Evolution of electrocardiographic changes was not accelerated. Other evidences of tissue injury or necrosis, such as leukocytosis and elevation of sedimentation rate, persisted as long as usual. Only the dying patients retained both salt and water and gained weight. This phenomenon, which appears to be primarily a function of the underlying disease, may be augmented by cortisone therapy. Survivors are able to maintain normal salt and water metabolism, despite steroid therapy. It was of interest that potassium balance remained slightly positive though no supplements were used.

No other undesirable side-effects of cortisone were noted. S. J. SHANE

Cardiac Involvement in Infectious Mononucleosis.R. J. HOAGLAND: *Am. J. M. Sc.*, 232: 252, 1956.

In a series of 100 consecutive hospital patients with infectious mononucleosis who had one or more electrocardiograms only five showed any abnormalities, and at least one of these was of questionable significance. The changes usually disappeared before the fourth week of illness.

Review of many reports of electrocardiographic alterations in infectious mononucleosis revealed that the "changes" were often not beyond the range of normal. When changes beyond normal limits were found, they were almost always transient and usually involved the T waves in lead II.

Myocarditis is not a clinically recognizable feature of infectious mononucleosis, and there seems to be no more reason to fear cardiac involvement in patients with mononucleosis than there is to fear iatrogenic cardiac anxiety. S. J. SHANE

On Differentiation of Rounded Tuberculous Foci.V. L. EINIS AND G. Z. SITNIKOVA: *Klinitscheskaya Meditsina*, 34: No. 8, 49, 1956.

The authors emphasize the need for classification of various types of rounded tuberculous foci because of a different therapeutic approach to each type. They distinguish three types according to clinical and x-ray findings. These are: (1) foci of "early infiltrate" type, (2) tuberculoma, and (3) closed cavities filled with caseous material. Clinical findings, course of disease and therapy are discussed in 62 patients.

Fifteen cases were of Type 1. Eight showed resolution after dietary or pneumothorax treatment. Seven were considered as belonging to Type 2 after treatment.

Type 2 (tuberculoma) included 31 patients who were followed up from 2 to 10 years. Ten patients were in a stationary condition without treatment; six had evidence of activity and were unsuccessfully treated with antibiotics. Fifteen patients were treated with pneumothorax, eight of them without benefit, while five showed a disappearance of activity clinically. Two cases were not evaluated. Out of eight mentioned cases five had a segmental resection later.

Type 3 included three patients. Thirteen patients could not be placed in any group because of an insufficient observation period. In practice classification into types is difficult and sometimes can be done only after clinical observation.

According to clinical activity the authors divide the rounded tuberculous foci into healed, stationary or progressive with presence of tubercle bacilli in sputum. They feel that different clinical and roentgenological findings indicate certain phases of development of the infiltrate or the tuberculous focus. V. R. JABLOKOW

SURGERY

The Subphrenic Abscess: A Necessary Re-evaluation.W. H. GERWIG AND B. BLADES: *Ann. Surg.*, 144: 356, 1956.

A subphrenic abscess may be camouflaged by antibiotics and present an innocent clinical picture till the organism escapes from drug influence and a sudden catastrophe presents. Postoperative pneumoperitoneum increases the likelihood and this is more common in thin patients with upper abdominal incisions. In a series of nine cases the anterior superior space and left subphrenic area, and a *Staphylococcus aureus* sensitive to chloramphenicol, were most frequently involved. An air bubble under the diaphragm which increases in size is an indication for drainage. Rupture into the pleural cavity may be the first localizing sign. Lack of fixation of the diaphragm and a pleural effusion do not rule out subphrenic abscess. BURNS PLEWES

Prophylaxis of Suppuration in Surgical Wounds.I. V. NESTEROV: *Khirurgiya*, No. 7, 38, 1956.

It has been observed that intramuscular injections of penicillin have little effect in preventing suppuration of postoperative wounds. The author refers to his earlier article (1951) which describes the method of prophylaxis of postoperative suppuration by way of irrigation of the postoperative wounds in layers with small doses of penicillin. Within three years (1949-1952) of clinical observations while this method was being applied the percentage of suppurations in elective and emergency operations dropped to 1.7. Thus the local application

of small doses of penicillin proved to be more effective than intramuscular injection of high doses. Doses not higher than 3000 units were found to be sufficient for the inhibition of bacterial flora in the wound.

In animal experiments on the length of deposition and concentration of penicillin in the wound, it was found that after an intramuscular injection of a physiological solution containing 10,000-13,000 units per kg. body weight, the concentration of penicillin in the wound after 3, 5 and 7 hours was 0.9, 0.4, and 0.1 unit respectively. Following introduction of 1000 units penicillin directly into the wound, after the same number of hours the concentration was 0.9, 0.5 and 0.3 unit respectively. The concentration increased proportionally with higher doses. The use of penicillin in combination with procaine and "ecmolin" increased the deposition and concentration of penicillin in the wound three times.

One may assume that the reaction of the organism to an intramuscular injection of penicillin is different, in that a protective barrier is formed around the wound which slows down the infiltration of the drug.

V. R. JABLOKOW

Intraarterial Injections of Procaine-penicillin in the Treatment of Inflammations of the Limbs.

A. A. FROM: *Khirurgiya*, No. 7, 41, 1956.

The author reports on 110 patients with limb suppuration who were each given from 2 to 15 intraarterial injections of procaine-penicillin. The dose consisted of 20 ml. 0.5% solution of procaine with 100,000 units penicillin.

Twenty-one patients with phlegmons showed marked regression of the inflammatory process after 2-3 days of treatment. Seven cases of acute osteomyelitis were healed without surgery. In 35 out of 45 acute exacerbations of chronic osteomyelitis disappearance of pain and oedema, lowering of temperature and normalization of peripheral blood picture were observed. However, procaine-penicillin treatment did not prevent exacerbation of chronic osteomyelitis. Twenty-four patients with trophic ulcers all showed improvement and in 11 cases complete healing, of which 5, however, had recurrences within a few months.

Acute inflammatory diseases are coped with after 2-4 intraarterial injections of procaine-penicillin administered every 24 or 48 hours.

Experiments on rabbits consisted in injections of procaine-penicillin into the shoulder muscles, the ear vein and the femoral artery of both healthy animals and those with an artificial abscess in the right thigh. Concentration of penicillin in blood and in muscles of both thighs was registered 45 minutes and 2 hours 30 minutes after injection. No correlation was found between the penicillin concentration in blood and the method of injection. In healthy animals concentration in blood is higher than in muscles. In animals with an abscess in the right thigh the penicillin seems to be adsorbed by the inflamed tissues and its concentration there becomes more than twice as high as on the other side and higher than in the blood. Highest concentration was obtained in the inflamed area after injection of penicillin into the artery on the same side of the body. The distribution of penicillin is apparently under control of a neuro-humoral mechanism.

V. R. JABLOKOW

Argentaffin Carcinomas.

W. J. ELDRED: *A.M.A. Arch. Surg.*, 73: 517, 1956.

Commonly called "carcinoids," these yellowish submucous tumours are often malignant. Mostly occurring in the appendix, they may be multiple in small intestine, or in Meckel's diverticulum, large bowel, stomach, pancreas or rectum. Recurrent symptoms of small bowel obstruction with a filling defect in the terminal ileum on radiographic examination should lead to suspicion of argentaffinoma. Another syndrome suggestive of argentaffinoma of the small intestine with metastases in the

liver and valvular disease of the right heart consists of sudden flushing of the skin, patchily distributed, changing to cyanosis, and asthma. The tumour is considered to secrete a hormone with vasoactive properties: serotonin.

Radical extirpation of argentaffin carcinomas with any discovered metastases often has resulted in long survivals. Sometimes irremovable metastases have seemed to regress after removal of the primary. Some are benefited by x-ray therapy. If a tumour is found in the appendix, a wide excision of the mesoappendix should be done.

BURNS PLEWES

Surgical Complications of Meckel's Diverticulum in Infants and Children.

C. D. BENSON AND L. M. LINKNER: *A.M.A. Arch. Surg.*, 73: 393, 1956.

A series of 60 paediatric cases of complications of Meckel's diverticulum, in all of which the diverticulum was the cause of symptoms, was studied. Haemorrhage was the commonest indication (40%) for surgery, especially in infants. Diverticulitis causing pain as the presenting symptom was seen in 25% of the cases and in all the preoperative diagnosis was appendicitis. Intestinal obstruction was present in 23%: in more than half, inversion of the diverticulum had occurred and in the rest a volvulus. Perforation and peritonitis occurred in 5% and a fistula at the umbilicus from birth in another 7%.

In achieving a mortality rate of only 7%, the importance of restoration of haemoglobin, salts and fluids before operation is emphasized. All the four deaths occurred in young infants, two of them premature, one newborn and one 5 months old.

In discussion, Dr. Willis J. Potts said, "... the blood from an ulcer in a Meckel's diverticulum ... is brick-red. ... It isn't pink—that comes from the rectum. It does not have jelly in it—that comes from an intussusception. When a child passes a large amount of brick-red blood, ask the mother whether it was a teaspoonful or a cupful. If it was a cupful and is brick-red, the child has a Meckel's diverticulum."

BURNS PLEWES

OBSTETRICS AND GYNÆCOLOGY

Hypopituitarism and Gonadal Dysgenesis.

W. P. U. JACKSON AND R. HOFFENBERG: *Lancet*, 2: 1237, 1956.

Jost (1853) suggested that the pituitary, as well as the testes, is essential for the normal differentiation of the genital tract in the male embryo.

It is postulated that intrauterine failure of the pituitary gland to produce gonadotrophin, with secondary gonadal failure, could explain cases of gonadal dysgenesis or male pseudohermaphroditism with low urinary follicle-stimulating hormone levels.

A case of congenital hypopituitarism is presented as further evidence in favour of this hypothesis.

ROSS MITCHELL

Addison's Disease and Pregnancy.

F. H. MOORE AND J. R. FREEDMAN: *Am. J. Obst. & Gynec.*, 72: 1340, 1956.

The prenatal and postpartum courses and delivery of a patient with Addison's disease were quite uneventful. A decrease in the pigmentation of the skin was noted during pregnancy but an increase occurred following delivery.

Cortisone therapy may indirectly increase fertility in Addison's disease.

Although the outlook for a pregnant woman with Addison's disease is much better than it has been in the past, the authors still feel that each case must be individualized. Each case in itself still presents a very

grave problem and should be handled jointly by the obstetrician and internist, and full co-operation must be secured from the patient as well as her family at all times.

ROSS MITCHELL

Roentgenologic Observation of the Birth Act During the Second Stage of Labour.

G. S. SCHWARZ: *New York J. Med.*, 56: 3352, 1956.

A roentgen investigation of the mechanism of labour remains confined to the occasional accidental exposure obtained when the patient unexpectedly delivers or nearly delivers her child in the x-ray department.

A primigravida of 20 was observed in the Sloane Hospital. Expected date of confinement was August 27, 1953. On August 17 cephalo-pelvimetry films revealed a flat posterior segment and a somewhat narrowed fore pelvis at the inlet. She was again admitted on August 27. Labour had begun at 2 a.m. The head was at station minus 4. The patient entered the x-ray department at 5.40 a.m. The membranes ruptured and birth seemed imminent during the radiographic exposure. Ten minutes later she was delivered of a normal infant weighing 2570 g. and with a biparietal diameter of 8.4 cm.

The anteroposterior diameter of the pelvic inlet, which measured 9.9 cm. on July 17 and 10.0 cm. on August 17, reduced to 9.4 cm. on August 27 after rupture of the membranes and after passage of the fetal head through the bony pelvis. The volume capacity of the inlet in terms of a sphere, as determined by the Ball method, rose from 505 to 520 c.c. between July and August but dropped to 470 c.c. after the passage of the fetal head. The fetal head gained in volume from 440 to 520 c.c. between the two studies as a result of fetal growth and further expanded after passage through the bony pelvis to 620 c.c. due to the release of hydrostatic pressure.

This series of films affords an opportunity to test the veracity of the growth curve of the mean circumference of the fetal skull established by Scammon and Calkins and modified by Hodges.

The biparietal diameter of the skull remained unchanged between the first two studies when it measured 8.2 cm. On the last film taken, this diameter cannot clearly be identified. It measures between 8.2 and 8.7 cm. It is assumed that it enlarged slightly after the passage through the bony pelvis. Its actual measurement after delivery was 8.4 cm.

The films do not permit accurate measurements of the transverse pelvic diameters because of poor visualization. They were all ample and do not seem to have changed appreciably during the period of observation.

ROSS MITCHELL

THERAPEUTICS

Blood Ascorbic Acid Level in Bioflavonoid and Ascorbic Acid Therapy of Common Cold.

W. L. FRANZ, G. W. SANDS AND H. L. HEYL: *J. A. M. A.*, 162: 1224, 1956.

The incidence and course of common colds were followed in 89 medical students and nurses who volunteered in a study of the efficacy of naringin, a bioflavonoid extracted from grapefruit peel and used in remedies for colds. One group of 22 subjects received 333 mg. of naringin and 65 mg. of ascorbic acid three times daily for three months; a second group received naringin only, another ascorbic acid only, and the fourth a placebo. These substances were administered in capsules as nearly alike as possible. Symptoms of colds were systematically recorded, and the levels of ascorbic acid in the blood were determined periodically. The average level of ascorbic acid in 22 men who were to receive ascorbic acid by mouth was initially 0.96 mg. per 100 c.c. of blood; after 12 weeks of taking only ascorbic acid the average for this group was 1.41 mg. per 100

c.c. of blood. In all groups and at all stages, the blood ascorbic acid levels for males were significantly lower than those for females. There was no evidence that the naringin affected the ascorbic acid level of the blood, prevented colds, or cured them.

S. J. SHANE

The Therapeutic Effect of a High-dispersion Emulsion.

E. A. KONJKOV: *Khirurgiya*, No. 7, 48, 1956.

The high-dispersion emulsion is a lyophilic emulsoid prepared from the semi-fluid dispersion medium, bee honey, and the semi-fluid disperse phase, cod-liver oil, with the aid of emulsifiers rivanol and flavacridine.

The emulsion adsorbs well a series of drugs used in the treatment of wounds: ichthyol, concentrated silver nitrate, iodoform, penicillin, etc., without disturbing their potency. In such combinations it has bactericidal properties. The emulsion is water-absorbent, non-irritating and of satisfactory consistency. It aids in wound healing by increasing osmosis and by providing a good nutrient medium containing activators of regenerating processes as well as by offering an ideal protection from drying. The emulsion has been applied successfully on extensive burns.

V. R. JABLOKOW

ANÆSTHESIA

Exacerbation of Pre-existing Neurologic Disease after Spinal Anæsthesia.

L. D. VANDAM AND R. D. DRIPPS: *New England J. Med.*, 255: 843, 1956.

Spinal anæsthesia should not be given to patients with any affliction of the central nervous system or spinal column because of the possibility of exacerbation of the disease process. The authors formed this opinion on the results of a long-term study and follow-up examination of 10,098 spinal anæsthetics. Case histories are presented of 11 patients in whom spinal anæsthesia appeared to cause an exacerbation of an underlying pathological process.

NORMAN S. SKINNER

RADIOLOGY

Radiologic Aspects of Operable Heart Disease. II. Retrograde Brachial Aortography.

H. L. ABRAMS: *Circulation*, 14: 593, 1956.

The background and technique of retrograde brachial aortography are described. An analysis of the normal aortogram in infancy indicates that there is relatively little change in the aortic silhouette during the first four years of life. At the "isthmus" of the aorta (the segment of the aorta between the left subclavian and the ductus arteriosus), an area of narrowing may be observed. This should not be construed as coarctation of the aorta in the absence of clinical evidence of its dynamic significance. Distal to the narrowing, a localized or diffuse dilatation of the aorta is frequently visible. Both the constriction of the isthmus and the bulge adjacent to the ligamentum arteriosum constitute variations in the normal anatomy of the aortic arch.

Among 86 cases in which retrograde aortography was performed, patent ductus arteriosus was demonstrated in 16, coarctation of the aorta in 15, and other anomalies in 4. Useful by-products of retrograde aortography include the post-aortogram pyelogram, visualization of the abdominal aorta and its branches, and vertebral aortographic studies.

Although retrograde aortography is not without hazard, no serious reactions followed the brachial injection of 35% Diodrast in 79 cases. In seven cases in which a 70% medium was employed, one death and one hemiplegia followed the procedure.

Retrograde brachial aortography, when properly performed, with careful attention to the indications and diagnostic pitfalls, is a relatively safe method with a high yield of operable lesions in infancy.

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OBITUARIES

DR. GERALD THOMAS ALTIMAS, 53, a Montreal obstetrician and gynaecologist, died in Montreal on February 3. He was born in Montreal and graduated from McGill University in 1930. He interned at the Montreal General Hospital and did postgraduate work at Johns Hopkins Hospital. Dr. Altimas was obstetrician and gynaecologist-in-chief at St. Mary's Hospital, Montreal, and was also an obstetrician for the Catherine Booth Hospital. He was a former president of the Montreal Obstetrical and Gynaecological Society and secretary for Canada of the reference committee of the Royal College of Obstetricians and Gynaecologists.

Dr. Altimas is survived by his widow and one son.

DR. WILLIAM NEWTON BARNHART, 94, a psychiatrist, died at Sunnybrook Hospital, Toronto, in January. He was born in Oro and graduated from the University of Toronto in 1891. Dr. Barnhart had been resident physician at the Toronto General Hospital and assistant surgeon at St. Michael's Hospital, Toronto. He went to the United States in 1906, and was a qualified New York State psychiatrist. He served in the U.S. Army Medical Corps in 1917-18.

Dr. Barnhart is survived by his widow.

DR. J. L. CHARLEMAGNE BERTRAND, 52, died in Montreal on December 28. He was born at Ste. Thérèse de Blainville, Que., and graduated from the University of Montreal in 1931.

DR. FRANK M. COLE, an eye, ear, nose and throat specialist, died on January 20 at Victoria Hospital, London. He was born at Wardville, Ont., and graduated from the University of Western Ontario in 1937. After internship at the Victoria Hospital for a year, Dr. Cole did four years' postgraduate work at the Central Nose and Throat Hospital, London, England; Moorfields Royal Ophthalmic Hospital, London; the Polyclinic Hospital in New York City and Rochester General Hospital, N.Y., where he was resident surgeon. In 1942 he joined the Royal Canadian Army Medical Corps, serving on the examining board. Dr. Cole returned to London in 1946, and joined the eye department of Westminster Hospital.

He is survived by his widow and one son.

DR. JOSEPH HOWARD CRYAN, 78, a medical officer of health for 20 years, died at Prince Edward County Hospital, Picton, Ont., on January 20. He was born in Williamsburg, Ont., and graduated from Queen's University, Kingston, in 1903. Dr. Cryan later did postgraduate work in New York. He settled in Picton in 1940.

He is survived by his widow and two daughters.

DR. THOMAS JOHN GOODFELLOW died at Saratoga Hospital in Saratoga Springs, N.Y., in January. He was born in Parham, Ont., and graduated from Queen's University in 1909. He had been a member of the surgical staff of Saratoga Hospital from 1915 until his retirement in 1955. He was still in private practice and a consultant for the hospital at the time of his death.

DR. EUGENE LANDRY, 78, former mayor of St. Barthélemy, Berthier County, Que., died in Louiseville Hospital, Que., on January 17. He was born in St. Jacques, Montcalm County, and graduated from Laval University in 1904.

Dr. Landry is survived by his widow, one daughter and one son.

LT.-COL. GEORGE HAGARTY McLAREN, 79, former commanding officer of the 48th Highlanders and a retired surgeon, died at Thornhill, Ont., on January 7. He was born in West Flamboro township, Ont., and graduated from Trinity College in 1899. He was a member of the Royal College of Surgeons and a licentiate of the Royal College of Physicians of Canada. From 1900 to 1906 Dr. McLaren practised at the County of Carleton

General Protestant Hospital, Ottawa, at the Toronto General Hospital, as medical superintendent of the Hamilton General Hospital and as surgical officer at the Birmingham Eye Hospital, England. From 1906 to 1908 he was assistant superintendent of the Ophthalmic Hospital of the Egyptian government. From 1908 until World War I, Dr. McLaren was at Grace Hospital and the Toronto Hospital for Sick Children. He served overseas with the 48th Highlanders and commanded them for two years after the war. He retired from medical practice in 1921 because of war injuries.

Dr. McLaren is survived by his widow and two daughters.

DR. FRANK G. MACK, 68, Emeritus Professor of Urology at Dalhousie University, Halifax, N.S., died in January. He was born in Bridgewater, N.S., and graduated from the University of Toronto in 1914. Dr. Mack did postgraduate work at the Toronto General Hospital and the Montreal General Hospital. In 1917 he was appointed to the staff of the Victoria General Hospital, Halifax. In June 1952, he retired as Professor of Urology. He was a Fellow of the Royal College of Surgeons (Canada), and a Fellow of the American College of Surgeons. Dr. Mack was a past president of the Halifax Medical Society.

He is survived by his widow, one son and three daughters.

DR. EDWIN ARMITAGE TOMKINS, 80, died in Sherbrooke Hospital, Que., on January 23. He was born in Coaticook, and graduated from Bishop's University Medical School. He later studied at the New York Post Graduate School of Medicine and the New York Eye and Ear Infirmary. Dr. Tomkins was a Fellow of the American College of Surgeons. He practised at Richmond from 1901 until 1923, when he moved to Sherbrooke.

Dr. Tomkins is survived by his widow and two sons.

DR. A. G. BROJ

J.W.B. writes: "Dr. Alojzy George Broj (Piechaczek) was born in Male-Zimnice, Silesia, Poland, on April 4, 1896, the son of Vincenty and Rozalia Piechaczek. He studied medicine in the University of Breslau 1917-20. He then studied in Cracow and Poznan, Poland, and graduated in medicine in July 1923. After one year in internship Dr. Broj began general practice in Witkowo, Poland. In 1931 he gave up general practice and specialized in skin and venereal diseases at the University Hospitals in Warsaw (1932), Vienna (1933), and Poznan (1934). In 1934 he received his certification as a specialist of skin and venereal diseases. Till the outbreak of war he practised in Katowice, Poland.

"In 1941, after many hardships that took him to East Poland, Roumania and Cyprus, he joined the Polish Forces in the Middle East under British Command. Here he worked as a medical officer in various hospitals, mostly as superintendent of the department for skin and venereal diseases, until 1944. In August of that year he arrived in England with the Polish Military Hospital, No. 4.

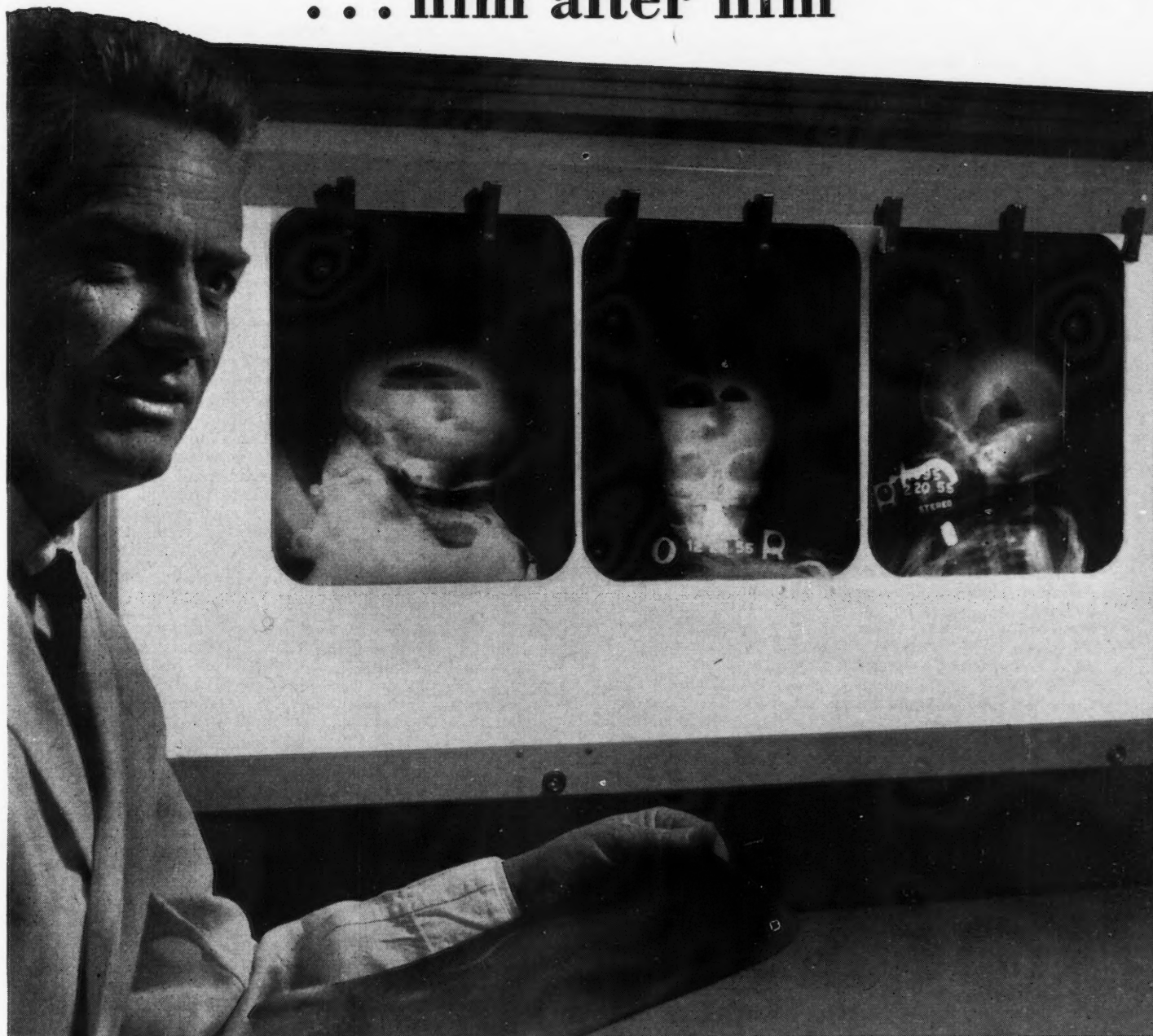
"Dr. Broj served as a medical officer in England and Scotland till his demobilization in 1947. He then held the post of superintendent of the Polish Military Medical Dispensary in Glasgow, until 1950, when he began general practice. The same year he became a naturalized British subject.

"In June 1954 Dr. Broj emigrated to Canada and interned in St. Joseph's and Victoria Hospitals in London, Ontario. On July 23, 1956, he commenced practice in Windsor, Ontario, having received his L.M.C.C. on July 18 of that year. His untimely death on December 30, 1956, is very much regretted, and the sympathy of the medical profession is extended to his widow, Evelyn, and his two children at home, Michael and Paddy.

"Hugh Walpole said 'Tisn't life that matters; it's the courage you bring to it.' This courage Dr. Broj displayed in his life.

(Continued on page 430)

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"Dr. Broy was buried in St. Alphonsus Cemetery, Windsor, on January 2, 1957."

DR. F. R. GUEST

J.W.B. writes: "Dr. Freeman R. Guest, the son of Richard and Margaret Guest, was born in London Township on January 26, 1894. His elementary education was in Fanshawe Public School, and his secondary in the London Collegiate Institute. He then entered the University of Western Ontario and graduated in medicine in 1914. The following years were spent in internship—Victoria Hospital, London (1914-15), the Ontario Hospital, Penetanguishene (1915-17), and Toronto General Hospital (1917-18). In the last hospital he specialized in obstetrics and gynaecology.

"Dr. Guest began the practice of medicine in Blyth, Ontario. In 1920 he came to Walkerville, Ontario, and was associated with Dr. Albert Phelps. In August 1923 he married Dorothy Thomas.

"Dr. Guest was a member of the Essex County Medical Society, and in 1940 was its president. He was also a member of the Ontario and Canadian Medical Associations. Dr. Guest was a senior surgeon at both Grace and Hotel Dieu Hospitals. With the opening of the Metropolitan Hospital he at once became a valuable member of the surgical staff, with greatest emphasis on orthopaedic surgery. In 1946 he became the chief of staff of this hospital, and this position he held at the time of his death. He served as surgeon to the Canadian Bridge Company for many years. He was a member of the Surgical Fellowship Club and the Detroit Academy of Surgery.

"In 1939 Dr. Guest received a Fellowship in the American College of Surgeons. The same year he was awarded the degree of Fellow of the Royal College of Surgeons of Canada. Upon obtaining these two fellowship degrees he discontinued general practice and confined his activities to general surgery.

"Dr. Guest was a member of the Beach Grove Golf Club, of the Masonic Lodge, the Eastern Star, the I.O.O.F. of Walkerville, and the Canadian Woodmen of the World. He was a member of Chalmers United Church.

"In the political field he served as a member of the Walkerville Council in 1928-29.

"Dr. Guest's major hobby was studying, and his motto was 'To know more to-day than yesterday.' Coupled with this we might put another equally important phrase, 'To do good general surgery.' He availed himself of every opportunity to further advance his work, and this he did by visiting clinics and attending conventions. He was considered a very capable diagnostician, and his services were eagerly sought.

"Travelling for education as well as recreation was another hobby. He loved his cottage in the north, for there he could both relax and study. Boating was a favourite pastime.

"Dr. Guest had himself been a patient, for he had undergone three major operations, as well as several minor ones. This helped him to have a thorough understanding of surgery from a patient's standpoint.

"The sympathy of the medical profession is extended to his widow, Dorothy, and his daughter Jane (Mrs. Robert T. Collyer) of London. Dr. Guest was in active practice in Windsor until six weeks before his death, which occurred in Florida where he had gone to recuperate from an attack of pneumonia. He died suddenly January 5, 1957, and was buried in Victoria Memorial Cemetery, Windsor, on January 9.

"In the death of Dr. Guest the Windsor District, and in fact all Canada, suffered the loss of a great surgeon.

"To have striven, to have made an effort, to have been true to certain ideals—this alone is worth the struggle."

"These words of Sir William Osler aptly describe the life of Dr. Guest."

PROVINCIAL NEWS

MANITOBA

Dr. H. J. C. Swan, cardiac physiologist, was a welcome visitor in the Winnipeg General Hospital on January 28. He took part in medical ward rounds.

Dr. Fred W. DuVal has opened an office for the practice of general surgery at 325 Medical Arts Building, Winnipeg.

Dr. Roper G. Cadham has been appointed medical health officer for Winnipeg, effective March 1, in succession to Dr. M. Loughheed. Dr. Cadham is Professor of Social and Preventive Medicine in the University of Manitoba and is a son of Dr. Fred T. Cadham, formerly Professor of Bacteriology.

On February 2 the new quarters for interns of the Winnipeg General Hospital and Children's Hospital was formally opened. It has accommodation for 86 interns and is situated on McDermot Avenue and Pearl Street, across the street from the Winnipeg General Hospital.

An Alumni Association of residents and interns of the Winnipeg General Hospital was instituted on February 2. The number of residents and interns to date is 1056. Dr. P. H. T. Thorlakson presided at the meeting in the auditorium of the Medical College. Dr. John Gunn and Dr. A. M. Campbell, former medical superintendents of the hospital, were on the platform. Dr. R. B. Mitchell gave an address on "The Winnipeg General Hospital as a Teaching Centre".

Dr. L. R. Rabson was named president of the medical staff of St. Boniface Hospital at the annual meeting. He succeeds Dr. Henri Guyot. Other officers chosen were Dr. A. C. Abbott, first vice-president; Dr. W. B. MacKinnon, second vice-president; Dr. M. Ranosky, secretary; Dr. Ross Willows and Dr. Paul Green, members-at-large.

ROSS MITCHELL

QUEBEC

The month started out with most of Montreal's larger English-speaking hospitals increasing their room rates, and giving the increased costs of operation and recurring deficits as the reasons. There were also increases in charges for such services as laboratory and x-ray. A number of other hospitals in the city also have served notice on Quebec Hospital Service Association (Blue Cross) that they intend increasing rates, but they have not yet made final decisions. Apparently none of the French-speaking hospitals are increasing rates at present. Increases in room rates, mostly in the semi-private and private categories and in some instances affecting public wards, range from \$1.00 to \$2.50 a day.

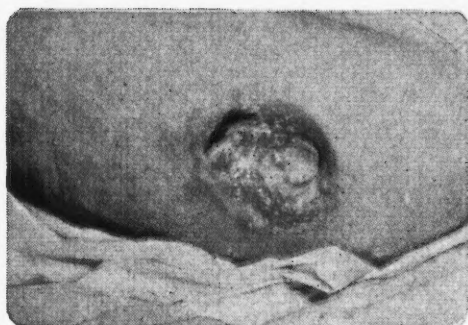
Dr. Hilliard John Wasson, a general practitioner in Victoria who graduated from McGill University in 1892, has left approximately \$250,000 to his Alma Mater to be used "in such manner as the Board of Governors may determine". Dr. Wasson, who died on May 19 last, was a classmate of the late Dr. Charles F. Martin, long-time medical dean at McGill. He interned at the Montreal General Hospital, established himself in practice at Nanaimo, B.C., in 1893, and continued there until after World War I. He then transferred his practice to Victoria, where he retired some years before his death. He was senior honorary member of the British Columbia College of Physicians and Surgeons. The University has not yet made specific allocation of the funds, but has stated that the generous donation is more than welcome at this time.

(Continued on page 432)

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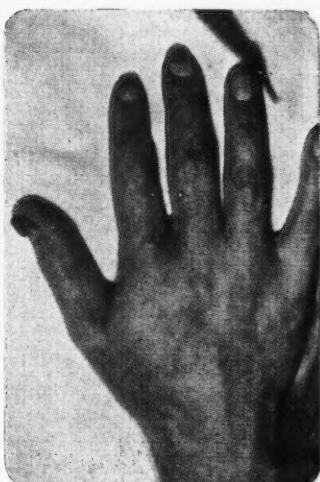
May 15th. Severe decubitus ulcer over femoral greater tuberosity in a terminally ill patient.



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The opening meeting of the 1957 session of La Société Médicale de Montréal was held at the Hôtel-Dieu Hospital on January 15. The guest speaker was Dr. Charles H. Best of the Banting and Best Department of Medical Research of the University of Toronto. The title of his presentation was "The History of Diabetes and Insulin and the Present Position of Insulin Adjuvants". Dr. Best traced the history of diabetes and efforts to battle it. It was mentioned in scrolls dating back to 1500 B.C. Since 1921, when insulin became available, some fifteen million persons have had their diabetic condition controlled. Unfortunately, however, we have not yet reached the summit—a sure cure for our diabetics.

Dr. Best emphasized that, although new oral treatments for diabetes are being presented, none of these have so far received approval of authorities either in Canada or in the United States. He urged doctors to be very cautious with any new oral treatment for diabetes.

At the same meeting, Dr. Jean-Marie Roussel was elected president of La Société Médicale de Montréal. He is the assistant director of the Medico-Legal Laboratory of the Province of Quebec. Other officers elected were Dr. Louis-Philippe Belisle, vice-president; Dr. Jean-Paul Legault, second vice-president; Dr. Georges Leclerc, secretary; Dr. Pierre A. Turgeon, treasurer; Dr. Gilles Leduc, assistant secretary; and Dr. Georges Hebert, counsellor.

The 20th Annual Meeting of the Canadian Association of Radiologists was held in Montreal on January 14 to 17. An extensive, varied and highly interesting scientific program was presented, highlighted by five-year reports on cobalt "bomb" treatments from the different cancer treatment centres in Canada. These were presented by Dr. T. A. Watson of Saskatoon, Dr. D. H. Thomson and Dr. Ivan H. Smith of London, Dr. R. J. Walton and Dr. James E. Bennett of Winnipeg and Dr. G. C. Catton and Dr. R. O. Kornelson of Ottawa. Advantages of this form of treatment that were emphasized are a better approach to deeper seated cancers, less damage to surrounding bone, less frequency and severity of radiation sickness and less serious skin reactions. There are now four cobalt units in Montreal and a total of 30 in Canada.

At this meeting Dr. Jean Bouchard, chief of the x-ray therapy section of the Royal Victoria Hospital and associate professor at McGill University, was elected president of the Association. Other officers named were Dr. A. McGee of Toronto, vice-president, and Dr. R. Fraser of Montreal, honorary secretary-treasurer.

The Montreal Medico-Chirurgical Society presented at its monthly meeting on January 18 a symposium on modern aspects of fluid and electrolyte therapy, chaired by Dr. Fraser N. Gurd. Participating speakers were Drs. W. G. Bauld, John C. Beck, J. L. MacArthur and J. R. McCorriston. This excellent program brought out the largest attendance that your reporter has experienced at these monthly meetings. Perhaps we should search for "home talent" more often.

On January 28, the Neoplastic Diseases (Oncology) Section of the Montreal Medico-Chirurgical Society met for luncheon at the Herbert Reddy Memorial Hospital. Afterwards a one-hour scientific program was presented at which Dr. Fraser N. Gurd discussed carcinoma of the colon in combination with multiple polyposis; Dr. Elisabeth H. Gray presented the application of exfoliative cytology in detection of cancer of the respiratory tract; Dr. Walter E. Kunstler described a case of carcinoma in an ectopic thymus gland, and Dr. M. B. Mackenzie presented a case of malignant melanoma with metastases showing spontaneous retrogression. This type of meeting—a monthly luncheon followed by a scientific program, through courtesy of the various hos-

pitals, as practised by this Section of our Society—certainly has a great deal to be said for it.

Dr. Wilder Penfield, director of the Montreal Neurological Institute, and Mrs. Penfield left Montreal by air on January 26 on the first leg of a six-week leadership tour for the Canadian Colombo Plan medical missions to the Far East. En route to India, Dr. Penfield delivered the Sir Charles Sherrington memorial lecture at the University of Liverpool on January 29. He and Mrs. Penfield will go by air to Karachi, New Delhi, Bombay, Colombo, Madras, Velore and Calcutta before returning to Canada in mid-March. A. H. NEUFELD

Pour la première fois depuis 1885, année de la création du Conseil supérieur d'hygiène de Québec, le nombre des cas de diphtérie n'a atteint que 42. Tels sont les chiffres du dernier rapport statistique de l'épidémiologie, rapport portant sur l'année 1956. En 1955, on avait enregistré 76 cas.

D'après les chiffres de décembre 1956, il y a eu au cours de ce mois 1744 cas de maladies infectieuses dont 1060 non déclarés mais dépistés. Pendant la même période, on a examiné 11,133 contacts et cas suspects et procédé à 113 enquêtes épidémiologiques.

Les cliniques antituberculeuses, au nombre de 184 pendant décembre, ont permis l'examen de 5068 personnes. On a fait, par la même occasion, 6974 épreuves à la tuberculine et au BCG. D'autre part, dans les territoires desservis par les Unités sanitaires de la province, 9114 personnes ont reçu la vaccination antituberculeuse (BCG), 3603 ont bénéficié de l'immunisation diphtérie-coqueluche-tétanos complétée, 1570 de l'immunisation de rappel et 16,038 de la vaccination antivariolique (réussie).

NOVA SCOTIA

Dr. H. C. Read has been appointed medical director of the Nova Scotia Division of the Canadian Red Cross Society Blood Transfusion Service. Dr. Read studied hæmatology on a Nuffield Fellowship at Oxford and carried out further postgraduate studies in military hospitals under a Banting Research Grant. His new duties as medical director of the blood transfusion service will be part-time only. He will continue as Head of the Department of Hæmatology, Department of Medicine, Dalhousie University.

Commissioner of Health Dr. A. R. Morton of Halifax has been named a member of the Royal Society of Health, London, England. The Society is a similar organization to the Canadian Public Health Association, of which Dr. Morton is a past president, and to the American Public Health Association, an organization which Dr. Morton served as vice-president for several years. WALTER K. HOUSE

CANADIAN ARMED FORCES

The following promotions, effective January 1, 1957, were announced recently: Acting Surgeon Commander J. R. Moore, RCN (Reserve) (Active List), of Vancouver, B.C., to Surgeon Commander; Surgeon Lieutenant Commander H. D. Hebb, RCN (Reserve) (Active List), of Edmonton, Alta., to Acting Surgeon Commander.

The following medical officers were promoted on January 1 to the ranks shown: To Wing Commander—K. W. Hampson and K. H. Running; to Squadron Leader—D. D. Macfie, P. E. A. Blake-Know, R. F. Jackson and L. A. Gazley.

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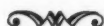
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BOOK REVIEWS

ELECTROCARDIOGRAPHIC TEST BOOK. 2 Vols.
Edited by T. Winsor. 167 and 132 pp. Illust. The American Heart Association, Inc., New York, 1956. \$5.00 postpaid.

This book, in two conveniently bound volumes, represents a successful effort in the art of teaching electrocardiography. Imagine a weekly seminar or conference on electrocardiography. The director of the department reads the electrocardiograms, and his associates and assistants discuss his interpretation which is correlated with a few pertinent facts about the clinical history and physical examination of the patient. In each case the discussion is finally summed up in a few sentences. The student or practising physician who seeks to learn electrocardiography would find it most profitable to attend such a seminar regularly. This book provides the equivalent with a high degree of fidelity because of the excellent method of presentation. On each of the first 119 pages in Volume I there is an electrocardiogram to be read and under it there are pertinent questions about its interpretation, so phrased that the question which is answered in the affirmative reflects the correct opinion. On the correspondingly numbered pages of Volume II, one finds the expert's answer and also a brief discussion and some clinical facts, including a reproduction of the chest x-ray picture in most instances. The student may thus make his own interpretation of each electrocardiogram and then compare it with the expert's opinion. The discussion of each record deals with points which commonly arise in reflecting and meditating about such records and contributes much to reproducing the effect of attending the seminar.

Part B of Volume I consists of 23 pages in which are listed 237 questions so phrased that by choosing one of two or more possible answers the student commits himself and then in Volume II he can find the expert's answer plus an explanation to account for the opinion. These questions are so well selected that by learning the correct answers the student acquires considerable erudition and his curiosity becomes stimulated so that he will turn to monographs on electrocardiography for further information. Volume I also contains an appendix, pages 144 to 160, in which there are tables listing the range of normal variations related to age and sex for each component of the electrocardiogram. At the end of this volume one finds a well-designed index.

The electrocardiograms are reproduced "life-size"; this is a great advantage. The printing and the format of the volumes are pleasing to the eye; this lends ease to the exercise of using this book.

SIX CHILDREN. Estelle J. Foote, Psychiatrist in Charge, Travelling School Clinic, Walter E. Fernald State School, Waverley, Mass. 317 pp. Illust. Charles C. Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. \$6.00.

This is not a textbook in the usual sense. The author records her impressions of the various types of children she saw during the nine years she was in charge of the Travelling Clinic of the Walter E. Fernald State School. Her findings are not documented and no statistics derived from "complete studies and examinations by Dr. Foote of over 3600 children" are presented. At the conclusion of the book, there is an index and bibliography. Of the 25 papers and books listed in the latter, 16 are dated prior to 1930. There is a notable lack of editing throughout the book.

Dr. Foote notes in the first sentence of the introduction that "The main characteristic of my clinic was its thoroughness." She very properly places great emphasis on the need for complete records in every case. Repeated references are made to the necessity for expressing oneself in "plain, clear English" and for avoiding "technical and

esoteric jargon." This book illustrates in several places the ambiguities and excessive wordiness which can occur when relatively vague terms are used in place of the more specific technical terms.

The "Six Children" referred to in the title are described in separate chapters entitled: "The Quick Thinking Child", "The Slow Thinking Child", "The Child Whose Brain has been Injured", "The Child Maladjusted Emotionally", "The Child of Unusual Cultural Background", "The Child of Unusual Training". "Two Additional Children" described as "The Child with an Unusual Physical Defect" and "The Child Called Delinquent" are discussed in a succeeding chapter. The author is most authentic when writing about the mentally defective and brain-injured children. Concerning each group, the author records what she considers the outstanding general characteristics without attempting to differentiate sub-groups according to any standard classification. Dr. Foote's sincerity and dedication to her work is everywhere evident.

The concluding section entitled "Forms and Charts" will be of interest to those who conduct school child guidance clinic services. There is a strong emphasis on the ultimate responsibility of the psychiatrist. One wonders whether the difficulties with psychometrists which Dr. Foote describes so vividly would be as liable to occur in a clinic where the members of the team work together as a problem solving group with shared responsibility under the leadership of the psychiatrist.

The author states her book is for "psychiatrists, pediatricians and general practitioners . . . teachers, supervisors, principals and superintendents of schools . . . all who work with children in diagnostic and treatment clinics. . . . And for parents. . . ." It is the opinion of this reviewer that the book will be received with considerable ambivalence among trained professional workers in diagnostic and treatment clinics and that it should have interpretation if read by others.

PRACTITIONERS' CONFERENCES. Held at New York Hospital-Cornell Medical Center. Vol. 5. Edited by Claude E. Forkner, Professor of Clinical Medicine, Cornell University Medical College. 396 pp. Illust. Appleton-Century-Crofts Inc., New York, 1957. \$6.75.

This is the latest in the well-known series of transcripts of Practitioners' Conferences held at the New York Hospital-Cornell Medical Center and designed for the bedside postgraduate teaching of physicians. As an example of the method employed, the first conference on sinusitis may be chosen. The panel contained two otolaryngologists, an allergist, a radiologist and a specialist in internal medicine. There is a verbatim transcript of the proceedings, including a blow-by-blow description of a Caldwell-Luc operation performed in front of the participants. Statements of the panel are summarized at the end by Dr. Forkner in an extensive digest of the proceedings. A few key references, a few diagrams and an illustration complete the conference.

The next conference is on peptic ulcer and includes a demonstration by a dietitian of the details of a peptic ulcer diet. Dr. Wolf's remarks on diet in peptic ulcer are illuminating. He stresses that there is not any acceptable evidence that doughnuts or fried fish, lettuce, tomatoes, celery, or chili con carne or even cocktails or cigarettes produce a sustained and substantial increase in gastric function. Perhaps the most relevant mechanism in the treatment of peptic ulcer, he says, is coming to grips with the patient and his life situation. That is much more important than the details of diet.

So the series continues with discussion on mitral stenosis, carcinoma of the cervix, hypertension, cerebral vascular accidents, thrombosis, sterility and impotence and a number of other important and topical subjects. With a little imagination, the reader can project himself into the scene as the conference unfolds. This is a stimulating way to learn.

MANAGEMENT OF EMOTIONAL PROBLEMS IN MEDICAL PRACTICE. Edited by S. Liebman, Medical Director, North Shore Health Resort, Winnetka, Ill.; Clinical Assistant Professor of Psychiatry, University of Illinois College of Medicine. 152 pp. Illust. J. B. Lippincott Company, Philadelphia and Montreal, 1956. \$5.00.

The material in this book is based on a series of lectures given to general practitioners on the management of emotional problems in everyday care of patients. It begins with a brief chapter on psychiatric emergencies which, as the author Dr. Bowman says, might be entitled "What to do before the psychiatrist comes." It contains advice on the management of suicidal attempts, violent patients, refusal to eat, drug intoxication, hysteria and mass panic. Therapeutic possibilities are described, but are not discussed in great detail. For example, the treatment of barbiturate intoxication is described only in general terms. The next chapter by Dr. Certy on the use and abuse of sedatives and stimulants is a good general discussion of the problems existing, particularly with the widespread use by the population of sedatives, tranquilizers and stimulants. There is a comparatively brief chapter on the management of the anxious patient and a long and detailed account of depressions.

Later chapters in the book get more off the beaten track, and provide helpful material on subjects not commonly well discussed in textbooks. Thus Billig has a chapter on the management of emotional reactions in the male involutional period, a subject which has attracted much less attention than the management of the menopause. Ham deals with that well-known patient, the multiple complainer, ending with a paraphrase of a statement by Menninger of the management of these troublesome clients. Bartemeier contributes a chapter on the management of over-eating, over-drinking and over-smoking and Alvarez a typical essay on the avoidance of production of iatrogenic disease. The latter should perhaps be learned verbatim by all young physicians. The book ends with suggestions for the utilization of community resources as an aid to individual medical care.

EINFUEHRUNG IN DIE PATHOLOGISCHE PHYSIOLOGIE (Introduction to Pathological Physiology). M. Bürger, Director of Medicine, University of Leipzig, Germany. 652 pp. Illust. 5th ed. Georg Thieme, Leipzig, 1956. DM 46.80.

This book is a well-written introduction to physiology applied to medicine. It deals with the pathophysiology of muscles and nerves; of circulation, respiration and their interrelationships; and dysfunctions of gastro-intestinal tract, liver, spleen, blood, endocrines, kidneys and skin. General topics such as the disturbances of meta-

bolism, of nutrition and of thermoregulation are presented, also infection and immunity and the pathophysiology of aging (*Biomorphose*). The author's original work in numerous fields is reported in detail.

However, like all textbooks on broad subjects and especially those written by a single author, it cannot be quite up to date. There is no mention, for instance, of the newer (1948) concept of the functions of the hepatic artery and its role in portal hypertension. The latter is treated in a cursory manner, its pathophysiology is barely sketched, and no reference is made to the (therapeutic) portacaval anastomosis and its effect on ammonia metabolism. One more example of many is in the section on peripheral vascular diseases, where one would expect a documented discussion on the pathophysiology of collateral circulation, so important for the understanding and management of the occlusive vascular accident.

Nevertheless the author has carried through his intention of giving a pathophysiological "background to clinical thought and teaching." The style in which the organized and well-illustrated material is presented is lucid and has the vividness a students' textbook requires. It makes good reading for the undergraduate as well as for the graduate. It offers a bird's-eye view of the basic and current theories in German medicine, and provides pertinent references for the English-speaking reader.

DIE LEBERKRANKHEITEN. Diagnostik und Therapie für die Praxis. (Liver Disease; Diagnosis and Therapy for Clinicians). Kurt Beckmann, Stuttgart, W. Germany, 253 pp. Illust. Georg Thieme Company, Stuttgart; Intercontinental Medical Book Corporation, New York, 1956. \$8.60.

This little monograph is essentially for the general practitioner. It was prepared by the late Professor Beckmann, based on his 30 years' experience in liver diseases. Professor Beckmann died just before the book was completed and it has been finished by his pupil, Dr. Bruegel. Emphasis throughout is on differential diagnosis and the simpler forms of investigation of liver disease. Therapy is also described, but not in as great detail as diagnosis. The most individual touch about the book is the emphasis on laparoscopy and liver biopsy of suspicious areas of the liver seen at laparoscopy. The book is illustrated with a series of laparoscopic pictures of hepatic lesions; some of the latter are in colour, and reinforce Beckmann's insistence on the diagnostic value of this technique. As regards laboratory techniques and surgical treatment of liver disease, principles and not details are set out in this monograph. The presentation of the material and production of the book are of high standard, and there is a selected but not comprehensive bibliography at the end.

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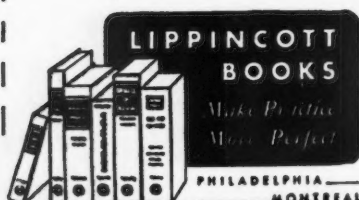
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PRINCIPLES OF CHEST X-RAY DIAGNOSIS. G. Simon, Brompton Hospital, London, England. 174 pp. Illust. Butterworth & Co. (Canada) Ltd., Toronto, 1956, \$10.00.

This book is written for the student radiologist and for the clinician particularly concerned with chest disease. The material is arranged under descriptive terms of radiological shadows rather than clinical diseases, in which respect it departs from similar reference works. The author points up the disadvantage of lack of general agreement in definition of terms commonly used in x-ray reports, and adheres to standard uniform method. The bulk of this short volume is concerned with pathological anatomy of common pulmonary diseases. The illustrations are excellent. Detailed descriptions, references and statistics are purposely omitted for the sake of brevity. An interesting feature is the inclusion of the author's views on simultaneous multi-section tomography which, although not uniformly accepted by radiologists, is a newly applied method with some definite advantages over the conventional technique. The appendix contains a well-presented summary of very practical technical notes of value to all radiologists. This book is highly recommended both to clinicians and radiologists alike.

INTERESTING CASES AND PATHOLOGICAL CONSIDERATIONS. F. Parkes Weber. 77 pp. Illust. H. K. Lewis & Co., Ltd., London, 1956. 18s. 6d.

This delightfully written book presents succinctly the author's experience with his "interesting cases".

These presentations vary from a discussion on thromboangiitis obliterans to the Steiner-Voerner syndrome by serotonin. Obviously this book has been written by an observing physician of great experience. The author is well qualified to illustrate the natural history of some rather unusual conditions. In many instances a short paragraph is appended stating briefly the newer concepts of the disease. These portions of the book will appeal to those who value an astute physician's appraisal of unusual entities and his personal experiences.

Included in the book is an excellent chapter on Paracelsus. The volume concludes with a suggestion to the President of the Royal Numismatic Society of interest to physicians who are numismatists.

NUTRITION FOR TODAY. Elizabeth Chant Robertson, Nutrition Research Laboratory. 259 pp. Illust. McClelland & Stewart Limited, Toronto, 1956. \$3.50.

The 1956 revision of "Nutrition for Today" has been brought up to date through inclusion of current information regarding nutrition, food production methods and governmental standards of practical significance. Additions or changes in the revision include information on enrichment of bread in Canada; the 1953 Recommended Daily Dietary Allowances of the Food and Nutrition Board of the National Research Council in the United States; and, throughout the text, minor changes due to newer knowledge of nutrition and changes in availability or processing of food. The recipe section has been omitted in order to avoid increasing the price of the book.

Essential food groups are systematically discussed in the belief that interest is aroused more readily in foods than in nutrients. A sound elementary knowledge of the science of nutrition is imparted. The practical rather than the theoretical aspects are stressed. Because of this, the book is ideal as a text for beginning students in the professional fields or as a quick reference for those whose daily work requires a practical knowledge of nutrition and food. While reference is made to experimental work in many countries, the reader is impressed with the significant nutrition research conducted in Canada.

Mention should be made of the fact that Dr. Robertson has based her text on the nutrient allowances recommended by the National Research Council in the United States. This is done because of the simplicity of the standards in comparison with the "Canadian Dietary Standards" of the Canadian Council on Nutrition. Those familiar with the two sets of standards will be aware that the American standards, while similar in many respects, advocate more generous allowances of several nutrients, the most significantly different being those for vitamin C. The Canadian standards are included for reference.

(Continued on advertising page 46)

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BOOK REVIEWS

(Continued from page 436)

DIAGNOSTIC PROCEDURES FOR VIRUS AND RICKETTSIAL DISEASES. Edited by Thomas Francis, Jr., and Joseph E. Smadel. 578 pp. Illust. 2nd ed. American Public Health Association, New York, 1956. \$7.50.

The second edition of this volume stresses the technical procedures which are considered the most useful and practicable in the diagnosis of the various diseases discussed. It is the work of authors who write with authority in their respective subjects. The various chapters have been written in a clear and concise manner. In the chapter on influenza, for example, the sections concerning the methods for

collection of specimens, for the preparation of immune sera, and for the haemagglutination and complement fixation tests are amply descriptive and yet precise. Great precautions have been taken to ensure that the reader will understand the mathematical examples and the methods for "setting up" the various tests.

Animal inoculation techniques and methods of tissue culture have been described in detail and with much clarity. The section dealing with tissue culture is up-to-date and especially valuable since this technique is relatively new and subject to many advances in recent years. The inclusion of ECHO viruses is to be commended, for these will probably prove to be of increasing importance, and, furthermore, tend to explain some of the puzzling results of previous laboratory isolations.

This book should prove a worthwhile addition to the library of any physician or research worker particularly interested in virus diseases.

WIRE BRUSH SURGERY. James W. Burks, Jr., Associate Professor of Clinical Medicine (Dermatology), Tulane University of Louisiana School of Medicine. 154 pp. Illust. Charles C. Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. \$7.50.

This volume has been written by a dermatologist who is obviously an enthusiastic devotee of dermabrasion using the wire-brush and skin-freezing technique.

The book outlines almost step by step the method, the preoperative preparation, the actual planing and the postoperative care. The text must be read carefully in order to avoid misinterpretation. For example, on page 141 it is stated "the pigmentation and scarring of chronic radiodermatitis can be improved by planing" whilst on page 146 we find "chronic radiodermatitis . . . represent(s) such contraindications" in discussing contraindications to planing therapy.

Many of the pictures are of little value in that preoperative and postoperative pictures are of different size and obviously taken with different lighting (e.g. Fig. 5, page 101, and Fig. 62, page 140).

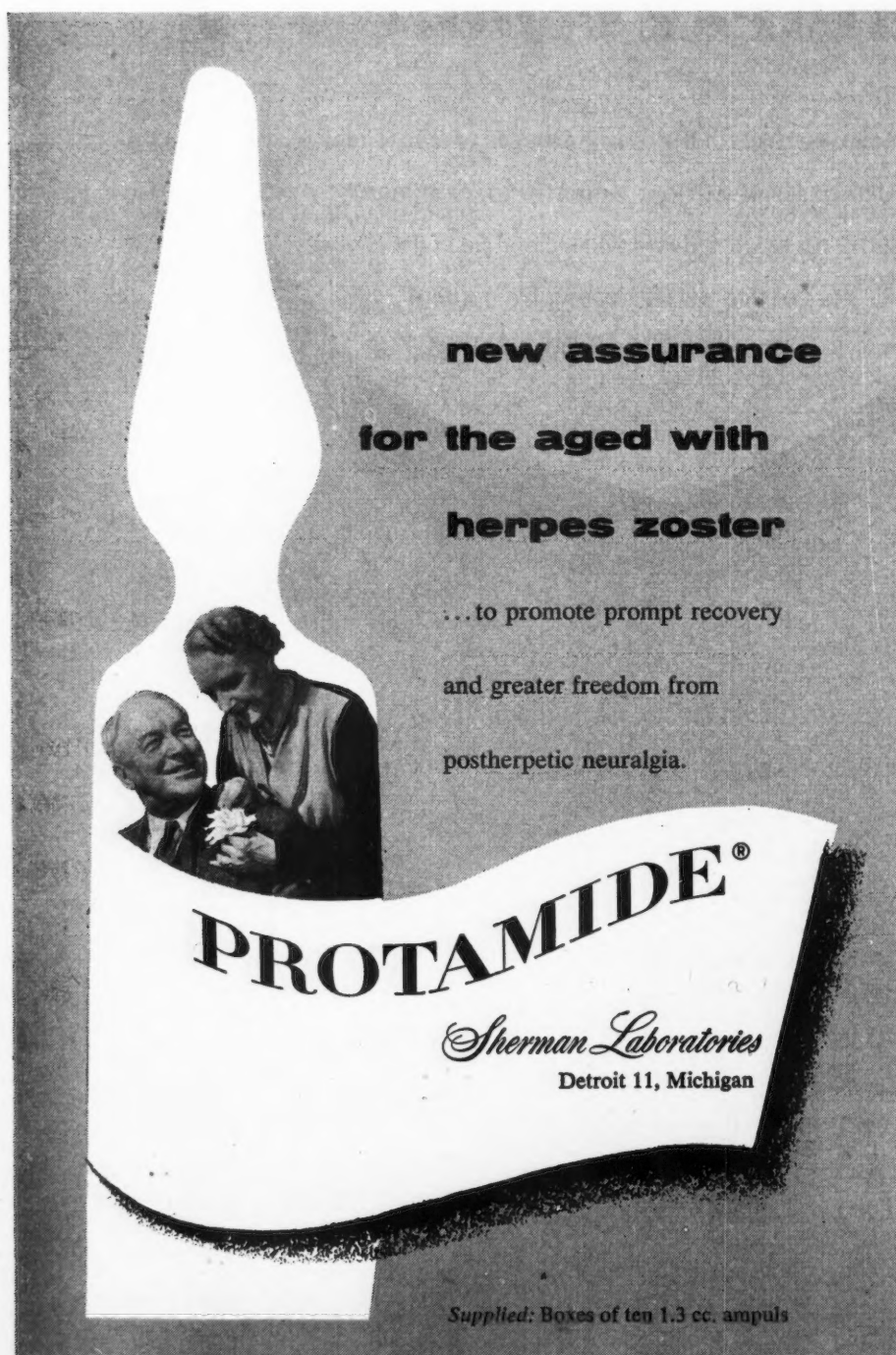
Many conditions are listed as being suitable for this form of therapy. Since it is important that an accurate diagnosis be established in many, if not all, of these conditions, it is not quite clear to the reviewer wherein the value of planing in many of these lesions lies. Of epitheliomas, presumably malignant from the text, it is written "the lack of resistance of the neoplastic tissue to the brush" can be detected "with experience". One doubts if surgical planing will ever be an acceptable therapeutic agent in this condition, or in the treatment of wrinkles since the basic cause cannot be reached by the brush.

This book will be of interest, and some value, to the dermatologist and plastic surgeon, in fact to all those interested in the treatment of skin lesions, but must be viewed as the work of an optimist.

ANATOMICAL TECHNIQUES. D. H. Tompsett, Prosector to the Royal College of Surgeons of England. 240 pp. Illust. E. & S. Livingstone Ltd., Edinburgh and London; The Macmillan Company of Canada Limited, Toronto, 1956. \$6.00.

This is a book that should be available to anyone who is planning to preserve and mount anatomical specimens, large or small. The author, a Ph.D., is a noted professional prosector who seeks, in his own words, to reveal as completely as possible all the tricks of his trade.

The reader will find here basic general information concerning instruments, materials, and the procedures used in mounting specimens, injecting vessels, making casts of ducts or cavities, and making models. Detailed descriptions are given of the special techniques used in the preparation of specimens of lung, heart, liver, kidney, spleen, internal ear and brain; an appendix of proprietary materials with addresses of manufacturers is included.



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MEDICAL NEWS in brief

(Continued from page 417)

MYELOFIBROSIS AND MYELOSCLEROSIS

The terms myelofibrosis and myelosclerosis are used to describe a rare condition in which bone marrow is replaced either by fibrous tissue or by bone in association with extra-medullary blood formation and appearance in peripheral blood of immature white and red cells. This uncommon syndrome may be one of a group of proliferative disorders affecting the primitive mesenchymal cells, so that it may be closely related to the leukæmias. Myelofibrosis and myelosclerosis are rare and occur in acute and chronic forms, usually in persons in the fifth and sixth decades of life. The cause is unknown.

Thirteen cases are described in detail by Richmond and Duncan of the University of Edinburgh (*Scottish M. J.*, 1: 337, 1956) in which the features were many and varied. There is usually a history of vague ill health for several years, and the most common symptoms are tiredness and loss

of strength, anorexia, loss of weight, dyspnoea, discomfort and upper left abdominal pain (due to splenomegaly) and pains in the legs. Some patients complain of bleeding. The main physical finding is of splenomegaly, which may be considerable. Peripheral blood shows a leuko-erythroblastic picture. By the time diagnosis is suspected, the marrow is usually fibrotic or sclerotic; this has to be confirmed by biopsy. The disease is invariably fatal, the course running usually from five to six years. Occasional blood transfusions may be required to maintain the hæmoglobin level satisfactorily, but there is no other specific treatment. In the present series Richmond and Duncan had splenectomy performed in four cases and one treated by radiotherapy. They point out that there is controversy about both these types of treatment. The spleen may be making an important contribution of erythrocytes to the circulation, but on the other hand it is often causing great discomfort, and may be causing hæmolytic anæmia or a bleeding tendency. Each case must be judged on its merits as regards splenectomy. Irradiation of the spleen is also a controversial treatment.

The authors call particular attention to the diagnostic value of radiological examination of the skeleton. In the 13 cases they have studied, eight had radiological features presumably due to myelosclerosis. In the cancellous bone there was an irregular, poorly defined meshwork appearance. This was best seen in the humeri and femora.

HOME CARE VERSUS INSTITUTIONAL CARE FOR THE AGING

Economic and other considerations point to the value of getting old people out of institutions and into the home circle for care of chronic disability. An interesting program in Allegheny County, which embraces Pittsburgh, is described in the *Ontario Medical Review* (23: 931, 1956) by Ferderber and Hammill. They have embarked on a program which regards the county institution for elderly and chronic sick as a post-graduate training school in which

(Continued on page 52)

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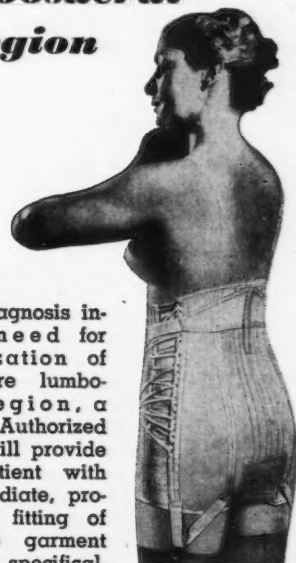
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MEDICAL NEWS in brief

(Continued from page 51)

these persons may be taught to manage themselves. Two types of person are admitted: the person who has been utterly neglected and responds rapidly to care and interest in the hospital, and the over-indulged person who may have created chaos in the family and resents bitterly transfer to hospital. The main point in the program is that after discharge patients may be followed up and dealt with in their own homes by a team in which the visiting or public health nurse takes much responsibility from the general practitioner. Thus the rehabilitation which has been begun in hospital can continue in the home, with very much less cost to the public. During hospital stay the patient is studied with a view to making an accurate diagnosis of disabilities and overcoming such as are possible. The problem of incontinence can be greatly reduced with intensive care in hospital, and community resources can be utilized in that surgical specialists and others may be called in from private hospitals to deal with complications arising in the chronic sick. Education and recreation of patients are taken care of, and the family is invited to observe the progress of the patient in hospital. Allegheny County is building a new hospital for long-term illness to house 2000 patients, with a complete floor devoted to rehabilitation and a modified colony plan in the ambulant section. There is no doubt that many communities could benefit from a study of the progress already made and the plans for the future in this area.

NUTRITION SURVEYS IN NOVA SCOTIA

The January 1956 issue of the *Canadian Bulletin on Nutrition* is devoted entirely to recent nutrition surveys and nutrition education programs in Cape Sable Island, Nova Scotia. The authors, Drs. Archibald, Eagles and Pett, state that this report concerns a study begun in 1948 by Dr. Archibald and developed as a project of the Department of Public Health of Nova Scotia. In association with this, Dr. Pett directed a nutrition survey during 1949 and a re-survey during 1954. The purpose of the

study was to conduct a nutrition education program, centred in schools, which would meet the nutrition needs of the community. The program had to be extended beyond the school, so that parents and all members of the community could understand and help in the work. The community selected presents many of the commonly found nutrition problems in Nova Scotia. The two surveys at the beginning and end of the program were used as the chief means of evaluating the effectiveness of the latter.

There were three approaches to assessment of nutritional status: (1) food intake patterns; (2) medical and dental examinations; (3) biochemical estimations of blood constituents. Dietary records were obtained for each individual for seven days during spring and autumn and scored in accordance with standards based on *Canada's Food Rules*. Biochemical examinations included estimation of haemoglobin and measurement of serum protein, ascorbic acid in serum, vitamin A and carotene. Blood smears were also examined. A statistically significant sample of the population was assessed in the two surveys. In 1949 the diets of 315 persons were recorded in spring and of 292 in September, while 70% of the group completed the survey by attending the clinic during July. In 1954 the spring sample contained 87 families and the September sample 70 families. The number completing the survey by attending the clinic was roughly the same as in 1949.

There was a definite improvement in dietary habits in 1954 compared with 1949. Dietary inadequacy was cut in half. No marked deficiency disease was found in 1954 and there was a lesser degree of malnutrition than in 1949. Faulty oral hygiene was the most common problem, dental caries and gingivitis being prevalent in all age groups in both surveys, although the latter finding had improved in 1954. Low haemoglobin values related to anaemia were an important finding; the incidence in 1949 was the highest encountered in Canada up to that time, but the prevalence had decreased considerably by 1954. Overweight and underweight were fairly common problems, especially thinness in children and overweight in female adults. Again the



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problems were not so marked in 1954.

The nutrition education program is described in detail. After the first survey, home visits were made to 59 families in whom individuals had shown nutritional deficiencies, and free drug treatment was provided for 96 members of these families. They were also given advice on diet, attention being particularly directed towards the food habits of pre-school children in the family. Nutrition education was carried out in the schools, and an in-service course for teachers was set up. A report of the nutrition survey was prepared for the population and discussed at meetings. Teachers and the general public were further informed through the course of the program by means of booklets, displays and talks. It is the opinion of the authors that educational efforts carried out in this community gave good results, and results which could be duplicated in other communities.

NETHERLANDS MEDICAL JOURNAL

The first issue of the *Netherlands Medical Journal* for 1957 marks the beginning of a second century of its existence. To commemorate this centenary, the publishers have reprinted a number of original articles which appeared through the course of the first century. The first of these original articles was written by Dr. Schmidt in 1858, and in it he discusses a few cases of Addison's disease, suggesting that the latter is a primary affection of the sympathetic system with a secondary degeneration or disorganization of the adrenals. In the second article, Heynsius describes the reasoning which has led him to think that the liver has a significant role in the formation of urea. Donders discusses diphtheritic paralysis, pointing out its generally favourable outcome and offering only tonics and a good diet as therapy. Fles speculates on a case of diabetes mellitus with atrophy of the liver and pancreas, and considers the role of the pancreas in this disease. Dr. Snellen (known for his test types) reports a case of neuroparalytic squint associated with trigeminal paralysis. Dr. Thomas gives an

(Continued on page 54)

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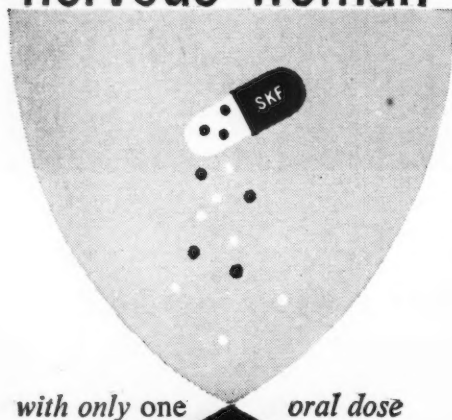


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MEDICAL NEWS in brief

(Continued from page 53)

account of an 1865 blood transfusion for obstetric hæmorrhage. Dr. Polano records the removal of an ovarian cyst in 1864, when this operation was a very hazardous one indeed. And so the march-past continues with case reports, practical hints, reviews, abstracts, letters from abroad and other items taken from an era long gone by, but of great interest to the student of medical history.

EFFECTS OF CHEWING TOBACCO

While we have a lot of data on the effects of smoking cigarettes and cigars, there is very little in the literature about the effects of chewing tobacco. Modern civilization has apparently not eradicated this somewhat unpleasant habit, for we are told that the annual consumption of chewing tobacco in the United States, for example, is 81 million pounds. Simon and his colleagues from Cincinnati (*J. A. M. A.*, 163: 354, 1957) studied the cardiovascular effects of chewing tobacco on 24 male volunteers who chewed the substance habitually. The age of the subjects ranged between 34 and 71 and results showed that chewing of tobacco for 20 minutes raised the pulse rate and the blood pressure (systolic pressure underwent a 10-45 mm. Hg rise and diastolic pressure a 5-20 mm. Hg rise). At the same time skin temperature fell, due to vasoconstriction, and the ballistocardiogram pattern deteriorated. The authors believe that these changes are attributable to the nicotine absorbed during the chewing of tobacco.

REHABILITATION CENTRE OF MONTREAL

In 1953 those concerned with rehabilitation in Montreal published an interesting brochure entitled "The Rehabilitation Centre". A second edition and revised version of this is now available at \$1 per copy; it is printed in English, French and Spanish, as No. 5 of an educational series on physical medicine and rehabilitation, published by the Rehabilitation Institute of Montreal. The

brochure is in essence a full description of a projected rehabilitation institute with floor plans and explanatory text. Building plans for such an institute in Montreal are practically completed; the property has been purchased and construction should be starting soon. A great deal of thought has gone into the production of this brochure, which has been modified from the 1953 edition in the light of further experience by Dr. Gingras and his colleagues in Montreal. The publication will be of value not only to Canadian physicians, but to anyone interested in rehabilitation elsewhere in the world.

INTERNATIONAL CONGRESS ON OCCUPATIONAL HEALTH

The 12th International Congress of Occupational Health will be held in Helsinki, Finland, from July 1-6, 1957. The President of the International Committee on Industrial Medicine, concerned with the arrangement of the Congress, is Professor Forssman of Sweden, and among the list of Vice-Presidents is Dr. R. B. Robson of Canada. Membership of the Congress is open to all physicians, engineers, chemists, industrial and public health nurses, research workers, and social security workers interested in occupational health. Intending visitors must register before April 1, 1957. The scientific sessions will include plenary sessions on industrial noise, evaluation of invalidity, industrial hygiene norms, and human engineering. There will also be sectional meetings on such aspects of industrial health as occupational pathology and hygiene, industrial nursing, and the general and social aspects of industrial health. Information from International Congress of Occupational Health, Haartmaninkatu 1, Helsinki, Finland.

COURSES IN PÆDIATRICS

The Children's Hospital of Philadelphia announces three short refresher courses in pædiatrics, to be given in May and June 1957:

Pædiatric Advances for Pædiatricians and General Practitioners,

(Continued on page 56)

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MEDICAL NEWS in brief

(Continued from page 54)

May 27-31. Conducted by the staff of the Children's Hospital in collaboration with the Department of Pediatrics of the University of Pennsylvania and the staff of the Camden Municipal Hospital. Tuition, \$110.

Practical Pædiatric Hæmatology, June 3-5. Conducted by Irving J. Wolman, M.D., and other members of the Hematology Department of the Children's Hospital, under the auspices of the Graduate School

of Medicine, University of Pennsylvania. Tuition, \$75.

Blood Group Incompatibilities and Erythroblastosis Fetalis, June 6 and 7. Conducted by Neva Abelson, M.D., and Thomas R. Boggs, Jr., M.D., of the Philadelphia Serum Exchange of the Children's Hospital, under the auspices of the Graduate School of Medicine, University of Pennsylvania. Tuition, \$50.

Inquiries should be addressed to Irving J. Wolman, M.D., Children's Hospital of Philadelphia, 1740 Bainbridge Street, Philadelphia 46, Pa.

CANADIAN RED CROSS SOCIETY

March is the month in which the Canadian Red Cross Society appeals to the citizens of Canada for financial support. The range and magnitude of its humanitarian activities across Canada must be fairly well known, but perhaps a few facts and figures about recent work will be of interest. In common with a number of other national Red Cross Societies, it is providing food, care and clothing for over 25,000 Hungarian refugees in Austria. Within four days of the Hungarian disturbances, a \$40,000 shipment of Canadian Red Cross relief supplies was aboard a plane bound for Europe. Hungarian immigrants were assisted at Gander Airport and all Hungarian immigrant ships and planes were met at Halifax, Saint John, Quebec, Montreal, Toronto, Winnipeg and Vancouver.

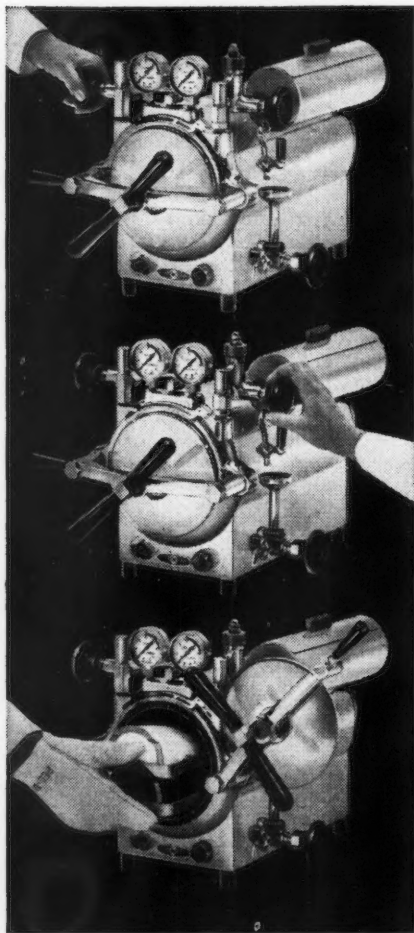
Last year the Canadian Red Cross Blood Transfusion Service provided over 124,000 free clinical Rh tests for expectant mothers. In less than 10 years Canadians have given 1,350,000 bottles of blood to the Transfusion Service. It is estimated that 97% of the work of the Red Cross is done by volunteers. Nevertheless a sum of \$6,000,000 is going to be needed this year to meet the many obligations of the Society.

INTERNATIONAL CONGRESS OF NEUROLOGICAL SCIENCES

The First International Congress of Neurological Sciences will be held in Brussels from July 21-28, 1957. This includes subsidiary congresses of neurology, neuropathology, electroencephalography, neurosurgery, epilepsy and neuroradiology. Full membership of the Congress is open to members of societies of the various disciplines concerned and associate membership to other medically qualified persons who are neither neurologists nor psychiatrists, as well as other scientists. The provisional agenda includes a discussion on subcortical and temporal epilepsy, a session on extrapyramidal pathology, a meeting on states of consciousness in neurology, a plenary session devoted to multiple sclerosis and demyelinating dis-

(Continued on page 58)

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

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MEDICAL NEWS in brief

(Continued from page 56)

eases, a meeting directed by Dr. E. H. Botterell of Toronto on therapeutic applications of hypothermia, a meeting on petit mal and various sessions on electroencephalography and neuropathology. On the last morning there will be a round-table conference on "Neurology at the crossroads". On July 28 there will be a celebration of the centenary of the birthday of Arthur Van Gehuchten at Louvain, which is not far from Brussels. Information from the Secretary-General of the First International Congress of Neurological Sciences: Dr. Ludo van Bogaert, Institut Bunge, 56 rue Philippe Williot, Berchem-Anvers, Belgium.

U.S. GRANT FOR RESEARCH
IN HEART THERAPY

The U.S. Public Health Service has announced a grant of \$575,000 to evaluate the effectiveness of drugs in treating heart disease. The grant was made to Dr. Alan E. Treloar, Director of Research of the American Hospital Association, to carry on a nationwide program co-ordinating activities of a number of research teams. The initial study will be concerned with hypertension.

As envisioned by Dr. Treloar and the American Hospital Association, an Advisory Board of medical research workers and clinicians will be responsible for establishing guiding principles of the program and making broad policy decisions. It is expected that this Advisory Board will include a representative of the Committee on Research of the Council of Pharmacy and Chemistry of the American Medical Association and also of the American Heart Association.

A central staff located in Chicago will include a clinician and biostatistician who will co-ordinate the activities of the project and provide valuable administrative and biostatistical services for participating investigators. A technical committee will be set up, composed of one representative from each of the hospitals and clinical research laboratories collaborating in the program, which will serve as a means of constant communication

between the various research teams and determine the details of research procedure.

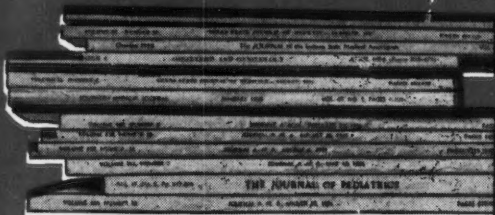
POSTGRADUATE COURSE
ON GASTROENTEROLOGY

A three-day postgraduate course on Gastroenterology will be presented at the University of Colo-

rado School of Medicine, Denver, May 13-15, 1957. The course will offer a broad and intensive review of present-day concepts and pertinent recent developments in this field. The faculty will include 28 guest physicians selected for their authoritative knowledge of their respective subjects. This faculty is made possible by the co-sponsor-

*"The average female
is borderline
iron deficient..."³*

IN MENSTRUAL



The bibliography specifies

1. Moore, C.V., and Dubach, R.: J.A.M.A. 162:197 (Sept. 15) 1956.
2. Holly, R.G.: Obstet. and Gynec. 2:124 (Aug.) 1956.
3. Ausman, D.C.: Journal-Lancet 76:290 (Oct.) 1956.

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ship of the American Gastroenterological Association. The annual meeting of this Association will be held at the Broadmoor Hotel in Colorado Springs immediately following the course.

In conjunction with the course, the Colorado Society of Internal Medicine will sponsor a dinner meeting at the Albany Hotel on

Monday evening. The guest of honour and speaker will be Dr. Hermon Taylor of London, England, whose subject will be "The Present Status of Medicine in England".

The Editors of *Gastroenterology* are arranging to devote one issue of the Journal to the publication of material from this course.

For a detailed program and further information, write to: The Office of Postgraduate Medical Education, University of Colorado Medical Center, 4200 East Ninth Avenue, Denver 20, Colorado.

LEDERLE MEDICAL FACULTY AWARDS

The Lederle Laboratories Division, American Cyanamid Company, has announced the names of recipients of Lederle Medical Faculty Awards for the year 1957. They include one physician in Canada, Dr. Sergey Fedoroff, Department of Anatomy, University of Saskatchewan, who has a 3-year award. The Lederle Medical Faculty Awards are intended to strengthen the preclinical departments of medical schools in the United States and Canada by contributing to the support of the teaching and research activities of members of such departments who already have demonstrated high quality of performance but who have not yet attained permanent faculty tenure.

BAHAMAS MEDICAL CONFERENCE

At the last monthly meeting of the Bahamas Branch of the British Medical Association in Nassau on January 3, the holding of another Bahamas Medical Conference during the week after Easter, April 23 to 30, 1957, was approved. This conference will be held at the British Colonial Hotel and the Princess Margaret Hospital in Nassau. On weekdays, lectures will be given from 9.30 to 11 a.m. and 5.30 to 7 p.m. There will also be two evening lectures and two meetings at the hospital, and two evening social gatherings.

The British Colonial Hotel has offered special rates for the participants of this conference and their wives. Hotel reservations should be made as early as possible by writing (air mail 10c postage from the United States or Canada) directly to Mr. Robert K. Holiday, Reservations Manager, British Colonial Hotel, Nassau, Bahamas, and by sending at the same time the registration fee of \$75.00.

As before, there will be ample time for recreational activities. There are direct non-stop flights to

(Continued on page 64)

ANEMIA...

Evidence shows that practically every menstruating female is in a state of precarious iron balance. Thus the iron deficiency state, due to even *normal* menstrual losses, is an extremely common occurrence.^{1,2}

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MEDICAL NEWS in brief (Continued from page 59)

Nassau from New York and from Miami on Pan American Airways and on British Overseas Airways. From Canada there are direct flights on Trans-Canada Airlines.

VITAMIN E RESEARCH GRANT

W. J. Gutterson, President of Webber Pharmaceuticals Limited, Toronto, Canada, announces an additional grant to the Montreal Cardiological Institute for further studies with vitamin E.

The first grant was made approximately two years ago and Dr. Paul David, Director of the Institute, in accepting the latest grant states that it will be used for the express purpose of instituting and completing a study using radioactive alpha tocopherol in rats to determine the utilization of the natural vitamin E. This additional project will be directed by Dr. J. Sternberg of the Institute of Microbiology and Hygiene, University of Montreal.

WORLD CONGRESS OF GASTROENTEROLOGIC SOCIETIES

The American Gastroenterological Association will be host to the World Congress of Gastroenterologic Societies, which will convene at the Sheraton-Park Hotel, Washington, D.C., on May 25 to 31, 1958.

The program will be divided into five major categories: (1) Peptic ulcer. (2) Carcinoma of the stomach. (3) Malabsorption and sprue-like states. (4) Nutrition in relation to lesions of the liver and pancreas. (5) Infections and infestations of the alimentary tract. Emphasis will also be put on training of the postgraduate student in diseases of the digestive tract. Modern methods of translation will enable each person attending the Congress to hear the presentations in the language of his choice. On Friday and Saturday, May 30 and 31, the annual meeting of the American Gastroenterological Association will be held in the Sheraton-Park Hotel. Commercial and scientific exhibits will be held in conjunction with the Congress in the Sheraton-Park Hotel.

OMBREDANNE AND HIS MASK

The modern anaesthetist recoils in horror from some of the methods of bygone generations. Some of the more primitive pieces of apparatus for anaesthesia also inspire revulsion in him. Nevertheless, in their time, these comparatively simple pieces of apparatus were responsible for the safe administration of many millions of anaesthetics. Anyone who has penetrated

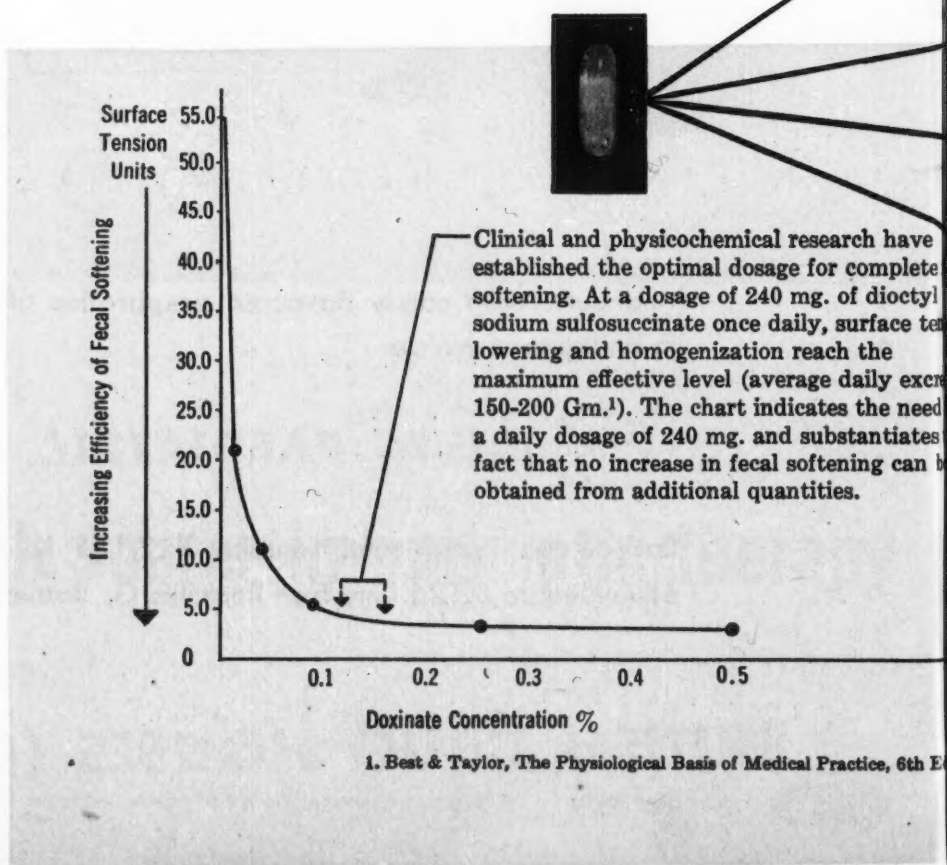
into a hospital in France during the last 50 years must have seen a celebrated piece of French ingenuity known as Ombrédanne's mask. The inventor, Professor Louis Ombrédanne, a great figure in French paediatric surgery, made the prototype of this mask himself after studying the carburettor of a motor-tricycle in 1907. At that time, deaths from chloroform were of frequent occurrence in French hospitals; Ombrédanne's mask sub-

The answer.

DOXINATE

THE ORIGINAL FECAL SOFTENER

IN CONSTIPATION



stituted ether for chloroform, was very simple to manage, and produced a primitive sort of closed-circuit apparatus.

We are reminded of this mask by the fact that Professor Ombrédanne, who was born in 1871 and retired in 1941 to take up the hobby of bookbinding de luxe, has recently died. In a eulogy read before the Académie Nationale de Médecine in Paris recently, Sauvé reminded his hearers that Ombré-

danne was a great personality, a Frenchman of the old school, an individualist of dignity and charm. In addition to the invention of his mask, Ombrédanne was celebrated for his description of the syndrome of pallor and hyperthermia, and for a commonly used type of orchidopexy.

SCHERING AWARDS

Three Canadian medical students have won honourable mention in

the 1956 competition for the Schering Awards. The three Canadians won recognition in competition with papers by students of medicine throughout the United States and Canada.

The Schering Awards were instituted 17 years ago to encourage medical students to explore current research and to correlate their findings in writing. Canadian students have won places on the Award list in each year of competition.

Gerald R. Berry of Dalhousie University was named in the 1956 Awards list for a paper on "The Clinical Use of Adrenocortical Steroids in Collagen Diseases". The second Dalhousie winner was Carl E. Abbott, who was cited for his thesis on "Metabolic Aspects of the Aging Process". The successful McGill student was Roland C. Way, who wrote on the same subject as Mr. Berry.

In naming the 1956 Schering Award winners the judging committee announced that the prizes will be increased to \$1000 for first place and \$500 for second in each of three categories in the 1957 competition.

AMERICAN HEART ASSOCIATION

In a recent news release the American Heart Association mentions that the deadline for submission of abstracts of papers for presentation at its annual scientific sessions is June 15. The scientific sessions of the A.H.A. are scheduled for October 25-28 at the Hotel Sherman, Chicago. Further information from the Medical Director of the Association, 44 East 23rd Street, New York 10, N.Y., U.S.A.

Other news items include the announcement of a new professional film in colour produced in Los Angeles and entitled "Disorders of the Heart Beat". This 22-minute motion picture explains the theory of development of abnormal heart beats and shows their appearances on the electrocardiogram and phonogram.

Dr. Eugene B. Ferris, formerly Professor of Medicine at Emory University School of Medicine, Atlanta, Georgia, has been appointed Medical Director of the A.H.A.

(Continued on page 66)

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MEDICAL NEWS in brief
(Continued from page 65)

The American Heart Association has prepared a leaflet entitled "Your Blood Pressure" for distribution by physicians and others to hypertensive patients.

**TEETOTALLERS IN
PARIS HOSPITALS**

Since time immemorial the patients in the public hospitals of

Paris have been allowed a ration of wine or beer each day. Teetotalers have had a hard time of it, for they have had to pay for the privilege of drinking mineral water, which in general is more expensive than ordinary beer or wine in Paris. However, concern by the health authorities at the high incidence of alcoholism and abuse of alcoholic drinks in France has led to a new deal for the patients. They may now have free

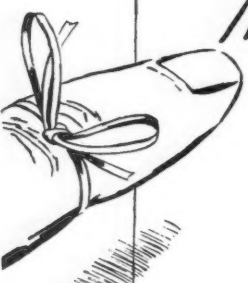
mineral water instead of wine or beer. One of the large mineral water companies in France has co-operated to the extent of selling their wares to the hospitals of Paris at a great discount. As a result the consumption of wine in Paris hospitals has dropped by 25% in three years.

**JOHN AND MARY R.
MARKLE FOUNDATION**

In the 1955-56 Annual Report of the John and Mary R. Markle Foundation, no major changes are announced in the policy of the organization, whose income is now above one million dollars per annum. Most of this sum goes to support 23 scholars in medical science, some of whom are in Canada. In addition, Northwestern University Medical School is receiving \$75,000 for a three-year study of an integrated program between pre-professional and professional training in medicine, and \$115,000 is going to the National Research Council Division of Medical Sciences in support of the Council's fellowship program and also of a study to determine whether an adequate number of young medical men and other scientists are being trained in research techniques.

**HIGH-SPEED PNEUMATIC
DENTAL DRILL**

There is a good time coming for all dental patients, according to the Swedish-International Press Bureau, which reports that in December in Paris, Swedish dentists demonstrated a high-speed dentist's drill holder with hard-metal burrs and operated pneumatically. This instrument is claimed to make tooth-drilling practically painless; indeed the patient finds it difficult to determine which tooth is being operated on. The invention, which is now being released for the general market, is the outcome of collaboration between a Swedish dentist, Dr. Norlen, and compressed-air specialists in Stockholm. An air turbine which gives the drill a speed of 50,000 r.p.m. is built into the holder. Operation is without vibration, and the necessary pressure is reduced to one-thirtieth of what is usually required.



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